RAILROAD GAZETTE

FRIDAY, MAY 19, 1893.

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Contributions.

The South Street Collision.

The Pennsylvania Railroad Company.
ALTOONA, Pa., May 15, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of April 28, in the editorial on the South street collision, the statement is made that at least one of the cars in the train did not have brakes on all the wheels. I have investigated this case and find that the train was composed of Pullman dining car "Compton" and Pullman parlor cars "Ethel," "Ursula" and "Ambrosia," all of which were equipped with triple brakes.

F. D. CASANAVE.
General Superintendent of Motive Power.

[We are glad to receive this correction. Our statement was made on the authority of an officer of the road who had full authority to get correct information in the matter.—EDITOR RAILROAD GAZETTE]

Cholera and the Railroad Car.

WASHINGTON, D. C., April 22, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Surgeon General Wyman, of the Marine Hospital, has shown me a letter from the President of the National Railway Surgeons' Association as to the meeting at Omaha on May 4, from which I learn that the relation of the railroad to the spread of cholera will be discussed as a principal topic, and an endeavor made to secure the adoption of preventive measures.

Conversation between us led to an offer on my part to write a preliminary article as to one aspect of the following subject: Can the closet of the railroad car spread cholera, and if so what preventive shall be adopted? Such is the question for which I beg a little space. It is useless to predict coming events. There may be no cholera, and yet a mechanical question that would arise should cholera appear may be timely and worth discussion even in view of the present hopeful sanitary prospect.

Cholera is spread in the first instance by discharges from persons affected with the disease, who may suffer only a mild diarrhœa for hours before severe symptoms set in, or the latter may not appear at all. Washington is a centre for sanitary science and I am not giving here my own opinions, but the very highest authority. I have talked with the best authorities, that I might feel sure that I understood the principles involved, but in their application I shall speak only for myself, and I claim only to be writing with so much light as a layman can be expected to get and give.

To return to the argument—in view of the facts stated, does the railroad closet threaten to spread cholera along the line of road in case of an epidemic at one or more points?

I find that the question must be discussed on theoretical grounds. The only fact discovered to me is quoted below. It is admitted by the best authorities that a passenger suffering with what to him is only an inconvenient diarrhœa could infect a stream supplying a town or city with water during the period of the passage of his car over a bridge. The event requires merely a series of coincidences. A similar event could occur at a spot on the roadbed, the day being wet and the drainage favorable.

But on a sandy soil or well-ballasted road-bed, the same being dry, the chain of causation would be broken, and as these conditions usually prevail during a railroad journey and persons suffering with cholera being only at very rare intervals passengers, even during an epidemic, the possibilities of danger are not considerable; emain like the links of a possible chain which favoring circumstances may at any time during such an epidemic most unexpectedly unite by that process we term a strange accident. In considering transportation of the disease, Dr. Ely McClellan (*American Practitioner*, August, 1874) thus treated the question. "In a large inland city the initial case of cholera in the epidemic of 1873 occurred in a small house so located that any substance dropped from passing railroad trains would inevitably fall close to the rear door of the dwelling." Cholera existing upon the line of a railroad it is quite rational, thought Dr. McClellan, to account for the sudden development of such cases by agency of the cars.

What, then, should be done in the case of an epidemic?

One might reply that in case the danger is regarded as real and immediate, provision could be made other than now exists in the closets of every car. The water closet would greatly assist to spread the infection by adding fluid to it. The average closet would need some kind of a receptacle, and if it is to serve six hours it must have the capacity of five or more gallons. One of the officials at Surgeon-General Wyman's office estimated for me the dejections of a full car as nearly five gallons for every six hours.

The mechanical problem involved in adding a proper receiving reservoir to the closet is worthy of consideration. The pail or reservoir should be disinfected when emptied, and must be thoroughly cleansed when replaced. Such a cleansing is not an easy process, and could the article be made of paper or other inexpensive material, and thrown into the pit with its contents, simplicity and safety would suggest this as the better method. The washing of such a vessel, in view of the danger demanding its use, must be with boiling water; water, in any quantity, not destructively hot is a dangerous substance to apply to cholera germs.

But why not give the interior of a substantial vessel a lining of water proof paper? Such a lining has proved a most successful experiment in attempting to remove that serious objection to the earth closet—emptying and cleansing the receiving pail. Lined with paper, the pail, when emptied, is left unsmeared and nothing in it but a little fluid, the entire contents slipping easily out with the false interior. But under the conditions of a railroad car in motion, so simple a solution might not be possible.

Even with no cholera threatening, the closet needs the attention of sanitarians. At the last convention of railroad surgeons it was asserted that 38 per cent. of closets devoted to men were found in a filthy condition, and there were few that did not give an unpleasant odor in summer.

In 1891 the American Public Health Association's Committee on Car Sanitation reported as follows: "The railroad authorities especially should see to the frequent cleansing of the closets and urinals. In this respect they are often derelict in duty. There is no sufficient excuse for the offensive odor frequently arising from these compartments and the traveling public should accept none. It should be the duty of some employé of the road to cleanse the urinals with sufficient frequency to prevent any unwholesomeness from this source. And it ought to be imperatively demanded that each conductor shall see that this service is efficiently performed while the train is under his control."

The writer is responsible for all expressions of opinions in this article. He has consulted the gentlemen named on only a few of the broader principles involved in the discussion of the danger of the spread of cholera by the railroad car.

X. Y. Z.

Improvements on the Pennsylvania Lines West of Pittsburgh.

It is a well known fact that for some years past large sums of money have been spent on the Pennsylvania lines west of Pittsburgh in permanent improvements. In the *Railroad Gazette* of Sept. 12, 1890, there appeared some particulars of the work done on the Pan Handle road between Pittsburgh and Columbus. The work in the direction indicated there has been carried on since, but recently the greatest activity has been on the line of the Pittsburgh, Fort Wayne & Chicago. On that line double track will be in operation between Pittsburgh and Crestline, 189 miles, by Sept. 1, and from Winslow to Chicago, 48 miles, by the same date. By June 15 the double track will be in operation from Pittsburgh to Massillon Junction, 110 miles. From Massillon Junction to Orrville, 14 miles, the work is in progress, and from Orrville to Millbrook, 16 miles, the double tracking is completed; from Millbrook to Loudonville, 16 miles, work is in progress. From Loudonville to Bucyrus, 46 miles, it is completed; also from Lafayette to Elida, 15 miles, and from Adams to Arcola through the city of Fort Wayne, 16 miles. By the 15th of June the double track will be completed for operation from Chicago to Wheeler, a distance of 37 miles. On that date, therefore, at least 208 miles, out of the total of 468 between Pittsburgh and Chicago, will be double tracked, and by Sept. 1 the double track will cover about 270 miles.

The arrangement of passing sidings now completed and in progress is, of course, one of the most important features in the development of the scheme. On the single-track sections there are lap sidings at intervals of about 4½ miles, each siding being a mile in length, thus giving two miles of passing siding at each lap. The arrangement of lap sidings for the double track is shown in the engraving below.

Between Pittsburgh and Palestine the double track was operated under block signals before May 1, and it was the intention to extend the block system over all the double track between Pittsburgh and Crestline by May 15. A number of the most important railroad crossings at grade have been interlocked.

At several places where the new double track is building grades have been reduced and the line straightened. The passenger equipment on this line has been increased about 25 per cent. and the locomotive equipment about 10 per cent. in anticipation of the World's Fair traffic, but of course the improvements of track which we have mentioned above have not been made by any means primarily to serve this traffic, but are the development of the necessities of the road.

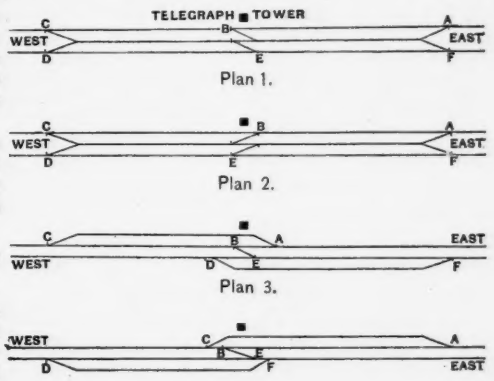
On the Pittsburgh, Cincinnati, Chicago & St. Louis the double track extends from Pittsburgh to Fernwood, 56 miles, and it is expected that by June 1 the double track will be opened from Millers to Port Washington, a distance of 39 miles. This leaves a gap between Fernwood and Millers of nine miles; then from Port Washington to Black Run there is another gap of 42 miles of single track, and from this point to Columbus, 42 miles, double track will be in use by the middle of July. From Newark to Columbus, 36 miles, the double track has been in use for some years. Second track has been completed, and is in use from Columbus to Mounds, seven miles, and there is a six-mile section of double track between Peoria Junction and Anoka Junction, on the Chicago division, and 20 miles from Riverdale to Chicago. The single-track portions of this line are equipped with lap sidings on all divisions. These sidings run from 4,000 to 5,000 ft. in length, and were carefully described in our issues of Sept. 12 and Dec. 26, 1890.

On this system the work of reducing grades and correcting alignment has been going on for a number of years. The grade at Hanover has recently been reduced from 39 to 26 ft. per mile, and the alignment from Curveton, on the Effner Division, to Royal Centre, on the Chicago Division, seven miles, is being changed to avoid the heavy grade between Logansport and Gebhart.

The block system is in operation between Pittsburgh and Fernwood, and between Anoka Junction and Logansport. On this line also, as on the Fort Wayne route, the passenger equipment has been increased about 25 per cent., and the locomotive equipment about 10 per cent., with a view to handling the World's Fair business.

Lap Sidings.—The diagrams illustrate the method of constructing passing sidings on the Fort Wayne line. There are four different plans, the use of which depends upon the local conditions.

Plan No. 1 is a middle siding with the pulling-out points at the tower. On this plan westbound trains take the siding at *A*, pulling out on their own running track again at *B*. Eastbound trains take the siding at *D* and pull out at *E*. The arrangement consists of two separate



Plan 1.

Plan 2.

Plan 3.

Plan 4.

sidings, each of which will hold four trains, which requires on the Eastern Division 4,300 ft. of track. The trains pull out at *B* and *E* without interfering with each other. There is, however, a connecting track between the two sidings, which makes it possible in case of an emergency to use the entire length of the sidings for trains in one direction. This is not done except in unusual cases. The telegraph tower is always located at the central point, or "lap," as it is termed, the switches *B* and *E* in the main track being, as a rule, operated from the inside of the tower by levers, placing upon the trainmen no responsibility in reference to this switch when they have a clear signal to go on, and preventing their moving out on the main track without the knowledge of the operator.

Plan No. 2 represents a middle lap sliding where the trains pull in at the tower. By this arrangement westbound trains take the siding at *B*, and pull out on the main track at *C*. Eastbound trains take the siding at *E*, and pull out at *F*. This plan of construction has not been used as much as No. 1. With this plan the entering switches at *B* and *E* would be operated from the tower, obviating the necessity for ingoing trains to stop before taking the siding. In order to control the outgoing movement and placing the operations of the sidings entirely under control of the operator, as it is in plan No 1, at the pulling out switches *C* and *F* an electric starting signal operated

from the tower should be placed, which can be interlocked with the switch, effectually preventing a train getting out without the knowledge of the operator.

Plan No. 3 is called an "outside lap siding," and is similar in plan of operation to No. 2. No. 4 is also an outside lap similar in operation to No. 1. The outside laps are used on long straight lines to avoid the necessity of putting the reversions in the main track which the construction of a middle siding would require. The method of operating is precisely the same as for Nos. 1 and 2, but the capacity of the passing siding in one direction can not be temporarily increased, as is the case with the middle sidings, except by crossing over and interfering with the through traffic in the other direction.

On the Eastern division the general arrangement of these sidings is at intervals of 10 miles, it being the intention to build additional sidings midway between them as the traffic may demand. The arrangement is based upon the theory that sidings having a capacity of four trains, at intervals of five miles, the switches of which are operated from the tower so as to obviate the stopping of trains, will permit of a maximum movement. When the traffic becomes too heavy for such a movement an additional main track or tracks will be required.

Heavy Traffic Movement.—An instance of the successful movement of a very heavy traffic over the Eastern Division which extends from Pittsburgh to Crestline, 189 miles, occurred last February. The Newcomerstown bridge on the Pittsburgh, Cincinnati, Chicago & St. Louis was washed out, and traffic was temporarily turned over the Eastern Division of the Pittsburgh, Fort Wayne & Chicago.

An abstract from the train dispatcher's registers for Feb. 11 shows that on sub-division No. 1, consisting of 35 miles of double track, there were, in 24 hours, 88 passenger, 108 freight and 3 work trains, a total of 199; on sub-division No. 2, consisting of 39 miles of double and 26 miles of single track, 36 passenger, 90 freight and 4 work trains, a total of 130 trains; on sub-division No. 3, consisting of 54 miles of double and 34 miles of single track, 32 passenger, 92 freight and 4 work trains, a total of 128 trains; making a total of 457 trains handled by the three sets of dispatchers within the 24 hours. Sub-division No. 1 extends from Pittsburgh 35 miles westward to Homewood; sub-division No. 2, from Homewood to what is known as "Stark Siding," about one mile east of Canton; sub-division No. 3, from that point to the end of the Division at Crestline.

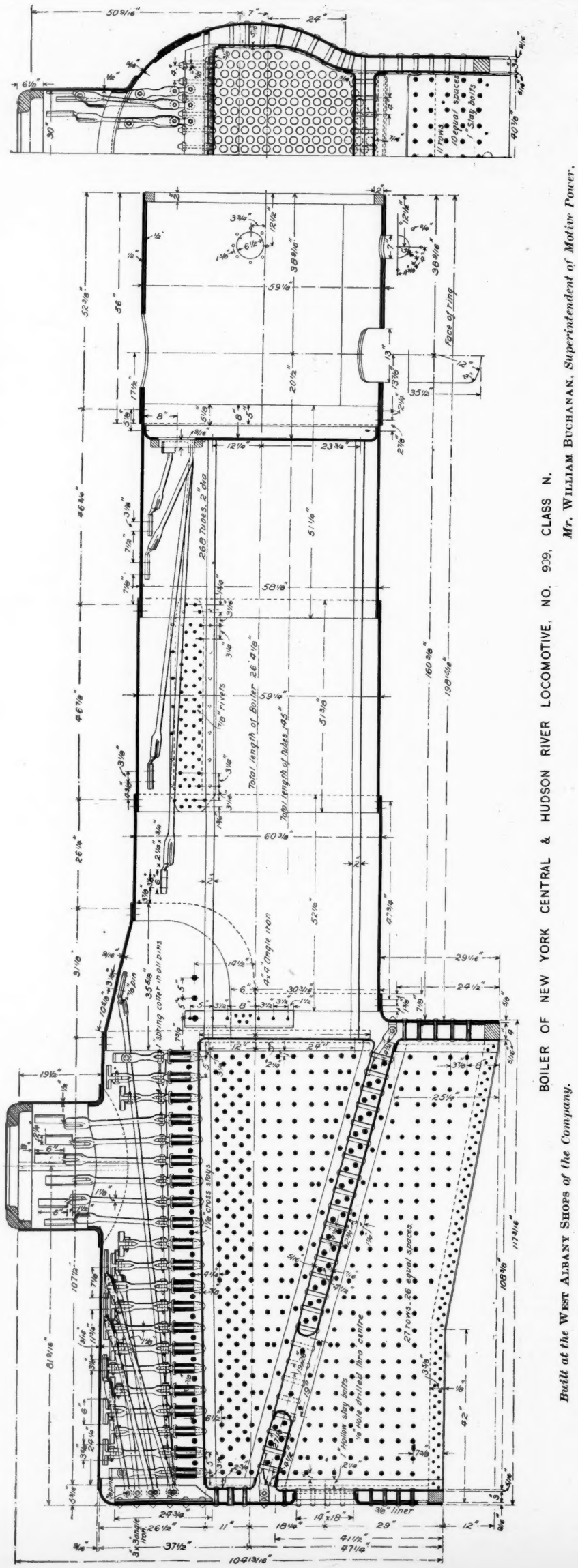
The only extraordinary arrangement that was made to provide for the increased number of trains was the change in the length of time the train dispatchers were on duty. Ordinarily they work on eight-hour turns. For the five days that the extra business from the Pan Handle was carried the hours were shortened to six, on the theory that they would be able to do better work and pay closer attention to the movement of all trains if their hours on duty were less. The results seem to justify this belief, as during the five days, when the traffic was about as given above, there was not a single mishap nor a case where any trains were delayed on account of their being overlooked or given improper orders by the dispatchers. For the run over the entire division, 188 miles, the average time of all passenger trains was seven hours; for freight trains, which make this run without changing either engine or crews, 14 hours.

The superintendent of this Division is Mr. A. B. Starr, and at the time of this performance Mr. J. K. Turner was Trainmaster, James Davis and W. E. Herbert, Assistant Trainmasters, and J. D. Lang, Chief Division Operator.

The Boiler of the New York Central Locomotive No. 999.

The details of the New York Central engine No. 999, which is the locomotive that has made a speed of a mile in 35 seconds, with a train, are of great interest, more particularly so the boiler, as the generation of steam is one of the great problems of high speed. As will be seen, this boiler is of the crown-bar, wagon-top type, and has the Buchanan firebox, which is almost universally used on the New York Central Railroad. There has been much dispute about the economy of using a water table in a firebox, but now that one of these fireboxes has taken part in the attainment of a speed of 102.8 miles an hour, with a train, the burden of proof is rather on those who have criticised the Buchanan firebox. The water table is formed of two inclined plates joined at the sides and ends to the firebox sheets. A hole 19 in. wide by 26 in. long laterally, is provided for the products of combustion to pass through to the tubes The arrangement of the sheets around this aperture is ingenious. The lowest sheet, $\frac{7}{16}$ of an inch in thickness, is flanged over to join the upper sheet, thus removing the riveted joint which would otherwise be against the fire. In this way there is only one thickness of sheet over the fire at the aperture. The top sheet of the water table is $\frac{5}{8}$ of an inch thick. The sheets are stayed by screw stays. All of the screw stays around the firebox have $\frac{1}{4}$-in. hole through the centre. These holes reveal a broken staybolt at once, and perhaps the combined area of these small openings assists in supplying air for combustion.

The firebox ring is double riveted. The back head is stayed by a series of vertical angle irons placed close


Face of Ring
268 Tubes, 2" dia.
Total length of Boiler 26'-4 1/8"
Total length of tubes 19'-5"
Sloping collar in oil pans
1/16 cross stays
Hollow stay bolts
3/8" liner
Built at the West Albany Shops of the Company.

BOILER OF NEW YORK CENTRAL & HUDSON RIVER LOCOMOTIVE, NO. 999, CLASS N.
Mr. William Buchanan, Superintendent of Motive Power.

together on a liner provided on the inside of the head. Where the water table joins the back head the head is stayed by short stays similar to those used in the front sheet of the outside firebox under the throat of the boiler. All of the horizontal and longitudinal seams of the boiler are butt jointed, with a welt inside and out. The thicknesses of the sheets in the shell are given in the cuts, and the location of the seams is clearly shown.

The boiler has 268 tubes, 2 in. outside diameter. These tubes have copper ferrules at both ends, and are rolled into the front end, and rolled into and beaded over the firebox tube sheet at the back end. The grate surface is 30.76 sq. ft.; the heating surface in tubes, 1,697.45 sq. ft.; heating surface in firebox, 232.92 sq. ft.; total heating surface, 1,930.37 sq. ft. The other details of the construction of this boiler are clearly shown in the illustration.

This boiler is one that has been used on the New York Central road for some time past, but how it compares with other boilers in efficiency is not known by the public, as no comparative tests have been published; but it is believed that the Buchanan firebox adds materially to the total steaming capacity of the boiler and probably something to the efficiency. The results in repairs have been very satisfactory.

The engine was shown in general elevation in our issue of April 28, and particulars of its famous run from New York to Buffalo were given last week, page 358.

Another Trestle Failure.

In our issue of Jan. 27 there appeared an account of what we suppose is the record-breaking trestle failure. A trestle 812 ft. long and 131 ft. high in the centre collapsed under a train. In that case the timber appears to have been sound and of ample dimensions for strength. It was, however, wholly without diagonal bracing, and the longitudinal purlins at each story were not run back to connect with the bank at either end; that is, the immense structure was wholly without longitudinal stiffness, and when a somewhat unusual shock came it went down like a house of cards.

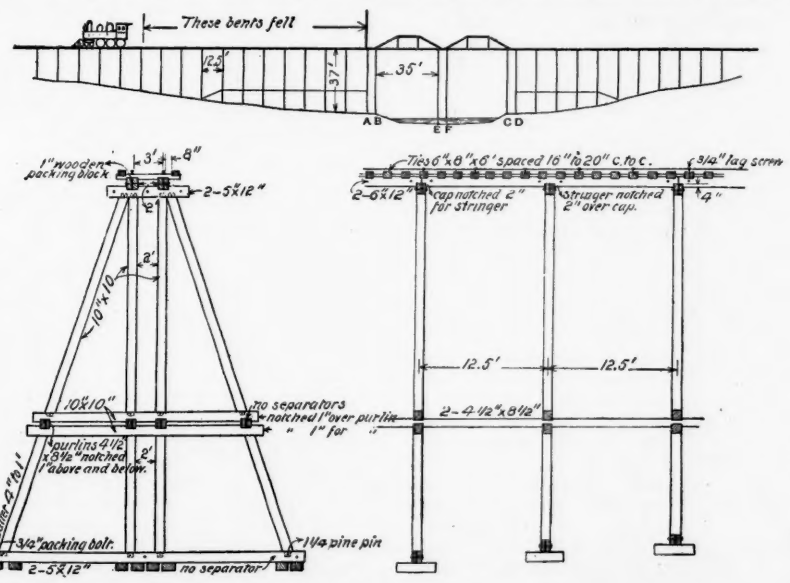
In this issue we show drawings of another trestle which has fallen within two months. The illustrations show quite completely the construction of the trestle, and that part of it which fell. In this wreck one person was killed and seven injured, some of them quite seriously, and at least one has died since. The train under which the wreck occurred, consisted of a mogul engine, six loaded freight cars, one passenger car and a baggage car. The tender and everything back of the engine went down with the wreck.

The road is of 3 ft. gauge, but it has freight cars of 40,000 lbs. nominal capacity, and three of those which were in the wrecked train weighed (gross) 50,000 lbs. each. These were loaded with guano, and were together in the train, and the best information is that the wreck commenced under these cars.

It is claimed that the first cause of the failure was the breaking of a car wheel, and it is said that a piece, about one-third of the wheel, was found 40 or 50 ft. from the track. The civil engineer who investigated the matter for us thinks that this theory is correct. The conductor was in the baggage car at the time of the accident and says that the first intimation he had that anything was wrong was by several heavy jolts, and a moment after his car went down. The engine was derailed and had run about 12 ft. on the ties, and it appeared at first as if the wreck might have been caused by the derailment of the engine, but the engineman says that the locomotive was runnning smoothly and the first hint of trouble was a heavy jerk, and looking back he saw the cars going down. The shock broke the coupling between the tender and engine, and the tender went down with the train, as we have said before. The engine was left standing about 12 ft. from the opening. The engineman thinks that the first failure was under the guano loaded cars, a little in front of the middle of the train.

The bents that fell and the position of the engine are shown in fig. 1. A bridge gang had overhauled and repaired this trestle five months before the accident, but they left it in very bad shape. When it was examined after the wreck, our correspondent found at least half the nuts missing from the stringer-packing bolts and a good many timbers badly decayed. The débris of the wrecked portion had all been burned except a little that had been carried away by a neighboring farmer; but a man who saw the wreck soon after it occurred told our correspondent that most of the timbers were decayed and that *nearly all of the tenons had been completely rotted away.* Under such conditions the only wonder is that the accident did not occur sooner.

It will be noticed that the stringers, made up of two pieces, 6 in. × 12 in., were not bolted to the caps, bu notched down 2 in. The other particulars of the construction of the trestle are probably sufficiently well shown by the engraving.



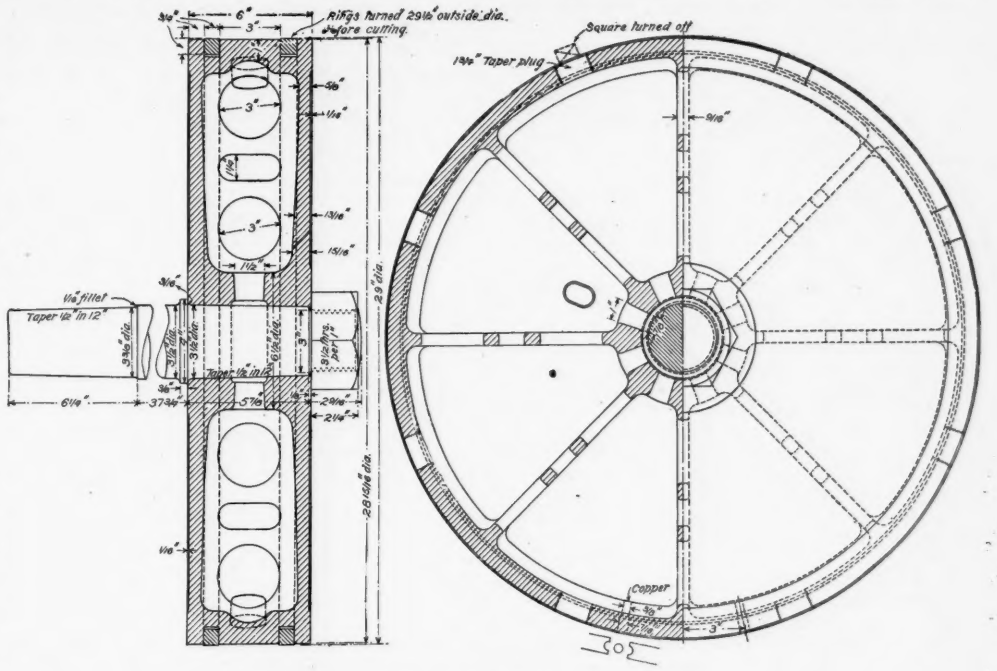
Another Trestle Which Fell.

Piston for Rogers Compound Locomotive.

Many locomotive designers have become convinced of the desirability of reducing the weight of reciprocating parts, and the fact that weight can in most cases be reduced by intelligent designing is clearly shown in the lightened crossheads, rods and pistons lately brought out. Probably this change is due in some measure to the efforts of the builders of two-cylinder compound locomotives, who find, in following their usual lines of construction in the designing of low pressure pistons, that the weight obtained is about twice that of the piston for a single expansion engine of the same power, and naturally they seek some means of avoiding any such increase in weight.

The *Railroad Gazette* has in the past two or three years made mention of several large pistons of light weight, among which are the 29-in., single plate, steel piston for the Chicago, Burlington & Quincy compound, the 30-in. cast iron piston of the Dean compound on the Lehigh Valley, illustrated Dec. 11, 1891, and the wrought iron and cast steel pistons of the Baldwin Locomotive Works, illustrated in our issue of Feb. 26, 1892.

The cut shows a 29-in. piston by the Rogers Locomotive & Machine Co., used on its first compound, built for the Illinois Central. This piston, as will be seen, resembles quite closely the Dean piston. It weighs 430 lbs.



Piston for Rogers Compound Locomotive.

with rings and is made of a mixture of 25 per cent. of steel punchings melted in a crucible, and 75 per cent. of cast iron.

American Passenger Cars at the World's Fair.

The exhibit of American day coaches at the World's Columbian Exposition is not as complete as that of locomotives and special freight cars, but it is representative and will convey to the foreigner a good idea of the comfort enjoyed in the best American day coaches. The different makes of sleeping cars are better represented.

The design of none of these cars shows any material change from the ordinary construction, but improvement is shown in the outside finish and the interior decorations and conveniences. The cars exhibited by the Wagner and Pullman companies have undoubtedly the finest finish of any cars ever built and the railroad companies that have sent cars for exhibition have shown the skill of the decorators employed by them.

Canadian Pacific.—The exhibit of the Canadian Pacific Railway is at the extreme north side of the space given up to railroad rolling stock; it consists of a complete train of five cars vestibuled throughout with the Barr vestibule and coupled with the Trojan automatic coupler. The baggage, second-class, and first-class cars, are carried on four-wheel trucks, and the dining and sleeping cars on six-wheel trucks. All the truck wheels are of wrought iron, single plate, with Krupp tires, and are 36 in. in diameter. The truck frames and bolsters are of wood supported by elliptic springs. The brake beams are also of wood. The journals are 4¼ in. diameter and 8 in. long. The outside sheathing of all the cars is mahogany, finished in the natural color and striped with gold leaf. Each car in the train is a representative of its class as used in every-day service by the Canadian Pacific, and all were built at the company's shops in Montreal.

The interior of the baggage car is finished in ash and is supplied with a cupboard and desk, and a couch for the use of the baggageman. For about one-quarter of the length of the car at each end the floor is depressed below the middle portion and covered with zinc. Over this is a slat flooring that can be removed, the object of which is to provide a place for drippings from express packages that contain ice. The car is lighted by oil lamps.

The seats in the second-class coach are arranged in pairs, as customary in sleeping cars, so that they can be made up in berths when desired, and above is the ordinary, though plain, upper berth. The interior finish is of light mahoghany and the ceiling of stenciled veneering. The seating capacity is 64 persons. Passengers traveling on second-class tickets are entitled to seats in cars similar to this, and if they wish they can pay 50 cents extra each night to have the berths made up.

There is a smoking room in each end of the first-class coach, the rear one always to be used so as to keep the smoke from the body of the car. There are also separate toilet rooms. The peculiarity of the interior of the car is the two arches sprung from side to side, and, though not obstructing the view from end to end of the car, they divide it into three sections, the more so as the seats at each arch are not reversible. There are two posts at each arch at each side of the aisle extending from the floor to the ceiling, and the main arch extends over the

aisle with two smaller ones from the posts to the sides of the car. There is a continuous shelf on each side extending the whole length of the car and supported by wooden brackets, hand-carved. The interior finish is of white Honduras mahogany on the sides of the car, and the ceiling is in heavy panels of the same wood. The doors between the body of the car and the smoking rooms, and at the toilet rooms, are also of solid oak. The seats are of the Forney pattern, with high backs and upholstered in light terra cotta plush. The car is lighted by either oil lamps or electricity; if the latter, there are eight 32-c. p. lamps to be used. The window openings are furnished with double sash and the blinds are heavy silk curtains. The whole interior of the car has a massive and cheerful appearance and the light finish makes it very bright.

The dining car "Savoy," like the first-class day coach, has an interior finish of white Honduras mahogany and heavily paneled ceiling of the same wood. The arch over the door at either end is massive and hand-carved, and suspended from it is a heavy silk curtain. On either side of each door is a heavy plate glass mirror. In the side panel over each table is a bronze alcove with miniature alcove beneath, and these harmonize well with the interior finish. The glass in the deck sash is stained a milky blue, in keeping with the other light furnishings. The sideboard, which stands directly in front of the entrance at the kitchen end of the car, is of solid oak, hand-carved, and supplied with the finest glass. The kitchen has a large range and all necessary utensils; also a steam table and copper tank for heating water. This room is finished in cherry and oak, and the service tables are covered with copper.

The sleeping car "Satsuma" has double staterooms in one end, each with a separate toilet room. Between the two compartments there is a sliding door by means of which the two may be separated or thrown together. The interior finish of the two rooms is the same as that of the body of the car—white Honduras mahogany with heavily paneled oak ceiling. The passages along the staterooms and the smoking room at the opposite end are all finished in oak. Between the smoking room and the toilet room is a bath room. The entrance to the main part of the car at either end is a high arch carved in handsome designs. In the space beneath each arch is bronze grill work, from which are suspended heavy silk curtains. There are eight sections in the main part of the car and these are upholstered in sage plush, with light silk head protectors.

The following table gives the weight, length and carrying capacity of each car:

	Weight tons.	Length.	Seating capacity.
Baggage	30	70 ft. 0 in.	..
Second class	32	72 ft. 0 in.	64
First class	32	71 ft. 8 in.	56
Dining "Savoy"	42¼	70 ft. 10 in.	30
Sleeper "Satsuma"	49	77 ft. 0 in.	32

Total length of train and locomotive, 400 ft.

These cars stand just beside the two coaches exhibited by the London & Northwestern, so a good opportunity is given to compare the English and American designs.

Harlan & Hollingsworth.—This company exhibits three cars in the annex to the Transportation Building. One of these cars is constructed like the passenger cars built by this company in 1836. One of the original cars, which the company expected to exhibit, was burned a few months ago, and the one sent to the Fair is made from the drawings and illustrations of the old car. There are two 4-wheel trucks constructed mostly of wood. The wheels are of wrought iron, with spokes, 33 in. diameter. The brake beams and brake shoes are of wood, the shoes having a wrought iron facing. The springs are half elliptic and rest directly on the boxes. There is a small semi-circular ladder at each corner of the platforms by means of which passengers reach the car. As with the American coach of to-day, the entrance is at each end with an aisle extending the length of the car. On one side of the aisle the seats, wide enough for two persons, are placed crosswise of the car, but on the other side is one long seat placed against the side of the car and extending the whole length. The seats are upholstered with a gray haircloth and are more comfortable than is generally supposed. The windows are only 6 in. wide, but between the windows are ventilators, which are closed by a vertical slide, and these, in warm weather, serve better the purpose of windows. The light for these cars at night is furnished from two candles, one on either side of the car, and a wood stove supplies the necessary heat in cold weather.

Standing on the same track with this old car, and next to it, is the club car, "Plainfield," built by this company for a club of gentlemen who live in Plainfield, N. J., and do business in New York. It is for their private use and is to run on the Central of New Jersey between Plainfield and Jersey City. There is but one thing on the exterior of this car to attract particular attention, and that is the painting of the trucks. All the iron work, except the wheels, is painted and grained in imitation of wood, a flagrant want of taste, for which perhaps the club is responsible. The body of the car is painted blue, the color of the cars of the "Royal Blue" line.

The interior of the car is very elegantly decorated. Just inside the door on the west end of the car is a very handsome semi-circular vestibule the width of the door, leaving room for a chair at each side of it. This is arranged with umbrella racks. Covering the vestibule is a dome, beautifully carved. The vestibule door is circular, and in it is a very heavy plate glass. The car is divided into two sections by a plate glass partition, and, excepting that in one end of the car are the toilet-room and Baker heater and in the other the vestibule, both sections are alike. One side is arranged with tables, five in each section, and at each table are four revolving chairs. There is a wine and cigar closet over each table, in the panel between the windows. The opposite side of the car is arranged with large easy chairs and one long settee. The interior finish of the car is mahogany throughout, and the chairs are of the same kind of wood, but stained a darker cherry color. Over each window is a triple rack of oxidized silver, resembling much a large punch bowl flanked by two smaller ones, and each connected with the others by oxidized chains. The ceiling is of oak panels with figured stenciling. The windows have double sash.

The third car of the exhibit is one built for the officers of the Ferrocarrill de Bahia Blanca el Noreste of the Argentine Republic, and was sent to the Fair to show how cars are constructed in sections for shipments to foreign countries. For convenience in shipping, the body of the car is divided into five sections and the roof into the same number, the framing of the car being so arranged as to allow of this. The car is wider than those used in the United States, as the road for which it is built is 5½ ft. gauge. Either end may be used for observation, as all the end windows are long, extending nearly to the floor. The side windows are wide; they have 36-in. glass. One end of the car is arranged for the dining compartment, but it also has a long seat crosswise of the car which can be used as a couch suitable for three persons. Next to the dining-room is the kitchen and pantry, well supplied with the conveniences of such places. In the other end of the car is a large compartment supplied with easy chairs and a couch similar to the one in the dining end of the car. Between the kitchen and this latter room is a bathroom, with all conveniences, a ladies' section suitable for three, and another section for men with accommodations for four, making the capacity of the car 13 persons. The interior is finished in quarter sawed oak, giving a very comfortable appearance. The car is provided with the English style of couplings, the hook and chain and tightening rods, and corner buffers, in common use in the South American countries.

"Royal Blue" Line.—Two cars of this well known line are on exhibition; one a composite baggage and passenger car, and the other a day car. The interior of these cars is finished in light mahogany, and the upholstering is in old gold plush. There are a smoking and a toilet room in one end of the day coach, and women's toilet and Baker heater in the other end. The outside is painted blue, with silver striping, and in the middle of each side is the coat of arms of Maryland. At the head of the train is the Baltimore & Ohio locomotive No. 859, "Director-General." It is a Baldwin four-cylinder compound, and is painted and striped to correspond with the cars.

Krehbiel Palace Car Co.—The exhibit of this company consists of three cars, and they are exhibited not so much to show what can be done in the way of fine exterior and interior finishing and decorating, as to show the design and construction of the cars. Each is a parlor car or sleeping car as desired, and by the arrangement of curtains each four seats of any car may be made into a section with passage through the middle or at the side. When the cars are used as drawing-room cars each seat may be revolved and placed in any desired position, and when transformed into a sleeping car two adjacent chairs are made up together into lower and upper berths, as wide as the ordinary, but neither berth being as high as in ordinary sleeping cars. The platforms between the cars are so inclosed and carpeted as to make a very convenient smoking-room, or the three cars are thrown into one large drawing-room. The windows have double sash with a mirror between the sash that can be pulled down about half the length of the window. The cars are provided with oil lamps and are wired for electric lighting. They are carried on six-wheel trucks, Allen wheels, and are equipped with the National hollow brake beam. Between two of the cars is a narrow Krehbiel vestibule, the platforms being provided with stationary steps; between the other two the vestibule is the full width of the car, and the steps are hinged so as to be pulled up when running.

The Old Colony.—This road exhibits one of its standard first-class coaches, such as make up the boat trains. The side paneling on the interior of the car is of mahogany with a dark finish, and the ceiling is veneer stenciled. The Hale & Kilburn seats are used, and they are upholstered with dark, wine-colored plush. Five Pintsch lamps furnish light at night. The windows are wide, are arranged in pairs, and have but single sash; the shades are of tapestry. The car was built by the Pullman company, and is equipped with the Pullman vestibule, Allen wheel, and National hollow brake beam. It is carried on four-wheel trucks.

The Pennsylvania Railroad Company.—Three cars comprise the exhibit of this company in the annex to the Transportation Building; the main exhibit is in a special building. One car is a track observation car, of which one end is entirely removed, and sloping back from it a tier of seats is arranged to give those sitting farther back a good view of the roadbed. The second is the track indicator car. This is a short car carried on four wrought iron spoked wheels with the indicating mechanism suspended from near one end. The third is a first-class day passenger car built at the Altoona shops. The first thing that attracts attention on entering the car is the extra width of the clear-story. This is nearly the full width of the car and gives a very agreeable effect of space. The interior finish is light, the sides being hand carved oak and the covering of the ceiling a light blue tapestry, with figures woven in. The seats are upholstered in red plush and the aisle floor is covered with a strip of heavy carpet. The car is lighted by the Frost light and is also supplied with oil lamps. A short section at either end of the car is taken up with the toilet-room and a seat extending lengthwise. The car is piped for heating by steam from the locomotive. It is equipped with the Pullman vestibule and iron brake beams, and is carried on six-wheel trucks. The wheels are of cast iron, cast in contracting chill. The exterior finish of the car is the well known standard of the Pennsylvania.

The Chicago, Burlington & Quincy.—This company shows one of its standard first-class coaches. It has a light interior finish, stenciled veneered ceiling, Hale & Kilburn seats upholstered with old gold plush, and is lighted by four double oil lamps. The windows have double sash. The flooring in the aisle is laid with narrow strips of light and dark woods alternating. The toilet-rooms are both in one end of the car, the other end being left free for seats. It is carried on cast iron wheels, four to each truck, and has the National hollow brake beam.

The Lake Shore & Michigan Southern exhibits two mail cars, both painted white inside and outside. One is supplied with bag racks and large boxes for through mail, and the other with small pigeon holes for assorting local matter. The cars have the Pintsch gas lights, six burners in each globe; pipes for steam heating; the Gould couplers; National hollow brake beam with safety hangers, and the Allen wheel. Each truck has six wheels. The cars were built at the company's shops at Adrian, Mich.

Besides these coaches and special cars are two complete trains exhibited by the Pullman company, and the Wagner exhibit, that have not been opened for inspection yet, and a description of which is therefore delayed.

The St. Mary's Falls Canal Tonnage Report.

General O. M. Poe returns the freight tonnage passed through this canal for the season of 1892, 233 days, and the freightage paid on it, as below:

Items.	Unit.	Quantity.	Price per unit.	Amount.
Coal	Tons	2,904,266	41	$1,190,749
Flour	Bbls.	5,418,135	16½	893,992
Wheat	Bus.	40,994,780	03.6	1,475,812
Grain, other than wheat	Bus.	1,666,690	03¾	62,501
Manufactured iron	Tons.	59,772	2.15	128,510
Pig iron	Tons.	41,748	1.23	51,350
Salt	Bbls.	275,740	15	41,361
Copper	Tons.	64,993	1.40	90,990
Iron ore	Tons.	4,901,132	1.00	4,901,132
Lumber	M. ft. b. m.	512,844	2.95	1,512,890
Silver ore and bullion	Tons.	1,930	2.25	4,342
Building stone	Tons.	39,698	1.67	66,296
Miscellaneous merchandise	Tons.	459,146	3.60	1,652,925
				$12,072,851

NOTE.—In these tables "tons" means net tons, or tons of 2,000 lbs.

These figures include the cost of loading and unloading. The total amount of freight paid, $12,072,851, divided by the total ton-miles, 9,222,773,938, gives the cost per ton per mile as 1.31 mills. The average distance freight was carried was 822.4 miles, which was 2 miles greater than in 1891; the aggregate tons carried was 11,213,333, of which 3.8 per cent. were Canadian, and the average freight paid per ton was $1.08.

The total passages for the season amounted to 12,580, and 1,887 of these were by 88 crafts under 100 tons register. Their aggregate register tonnage was 2,553, and their average tonnage 29 tons. The freight carried during the season by these crafts only amounted to 1,845 tons. There were 121 propellers and 24 sail vessels, carrying 2,000 tons and upward, and 37 propellers, carrying 2,500 tons and upward, averaging 2,767 tons. Twelve whaleback tow barges averaged 2,746 tons.

The greatest number of miles run during the season is to the credit of the propeller Thomas W. Palmer, of Detroit, Mich., and amounted to 48,044 miles. The greatest amount of freight carried during the season is to the credit of the propeller Castalia, of Cleveland, O., aggregating 82,309 net tons. This boat earned the same credit last season. The greatest number of ton-miles for the season is to the credit of the propeller Northern Queen, of Buffalo, N. Y., and is 6,553,900. This boat has the same credit three seasons in succession. The largest single cargo carried during the season is to the credit of the propeller Maritana, of the Minnesota Steamship Company, and amounted to 3,580 tons. The largest single cargo carried by a sail vessel (so rated in our reports) is to the credit of the Huron Barge Company's tow barge Sagamore, and amounted to 3,354 net tons.

The net registered tonnage passed through the canal during the 233 days it was open was 10,647,203 tons,

against 7,612,028 tons passed through Suez Canal for the calendar year.

The freight carried last season exceeded that carried in 1891 by 2,325,744 tons, or 26 per cent., and the amount paid for carrying it was $2,223,828.07, or 23 per cent. greater than in 1891. The legitimate delays to vessels amounted to 48,025 hours, or an average of 3 hours and 49 minutes for each passage.

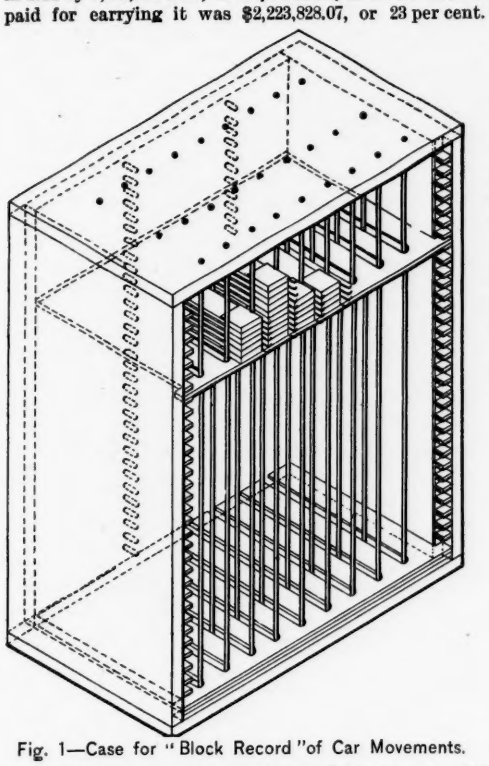


Fig. 1—Case for "Block Record" of Car Movements.

Wheeler & McNamara's Mechanical Car Record.

The illustrations shown with this article will give the reader a good idea of the apparatus for keeping a record of car movements by means of blocks, one block representing each car, which has been heretofore described in the *Railroad Gazette*, especially in the issue of Aug. 19, 1892. This invention has been described chiefly in papers by Mr. C. E. Wheeler, of Cleveland, Car Accountant of the Lake Shore & Michigan Southern. Mr. McNamara is Chief Assistant to Mr. Wheeler and they have obtained patents on the apparatus.

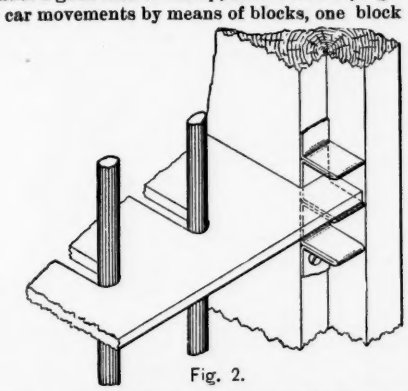


Fig. 2.

The essential feature of this system of records is a *block*, which is placed in such a position in a case that the number of the car which it represents is always in sight. This block carries a slip of paper showing the movements of the car for several weeks, or months, according to the number of movements made. Fig. 3 shows the block with a portion of a record sheet. The method of inserting the latter will be clearly understood from the drawing.

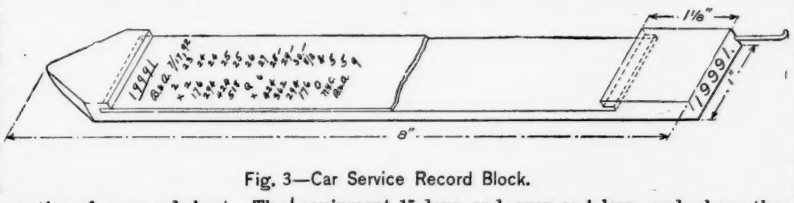


Fig. 3—Car Service Record Block.

Fig. 1 shows a section of the case with one shelf near the top and three unused shelves at the bottom. These shelves can be placed at any desired height on the metal notches shown at the sides of the case. The vertical metal rods serve to hold the blocks in position. The details of the support for the shelves are shown more clearly in fig. 2.

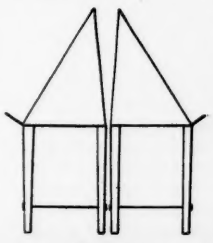


Fig. 4.

Fig. 4 shows a pair of frames, placed with their backs to each other, on which the cases are kept. By the use of the inclined position the blocks slide easily into place, and the numbers on their ends are at the same time in the most convenient position for inspection. Fig 5 shows a section of a drawer in which the paper slips, after being filled up and detached from the blocks, are kept on file. By this system of filing a large number of records can be kept in very small space, so that they can be preserved for many years without inconvenience.

Further particulars of this method of keeping car records will be found in the following extracts from Mr. Wheeler's description:

The mechanical record starts out with a small block eight inches long, one inch wide and one-quarter inch thick. Upon one of the ends the car number is painted in such a color as to show the kind of car. A black background and white figures, a furniture car; white background and black figures, common box; red background and white figures, certain specialty cars; white background and red figures, wagon cars, and so on, distinguishing equipments by color. Upon the surface of the block provision is made to slip into it a piece of paper and we have in effect a miniature car, which, as it moves from road to road and upon the home road, can bear its own record. When the paper slip is filled it is removed and filed away, another being placed in the block; or the slip can be removed monthly and the mileage computed.

The cases in which the blocks are kept are divided into two divisions, one for movements on the home road, the other for movements on foreign lines. The portion assigned to home records is, say, two feet high, two feet wide and eight inches deep. It is divided 10 times

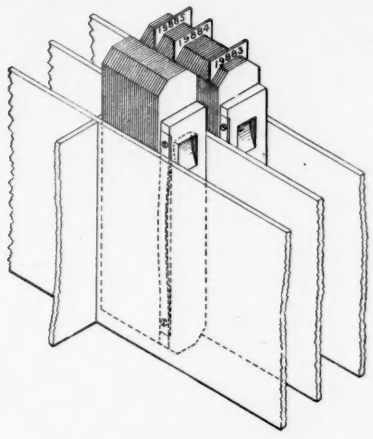


Fig. 5.

horizontally and 10 times perpendicularly by partitions, thus yielding 100 pigeons holes and permitting the location of all cars by the last two figures, car 22,869 going into the tenth perpendicular and the seventh horizontal compartment, and so with all cars ending in 69. Each case, which is from two to three feet high by six feet long, will provide for from 2,500 to 3,000 cars—one clerk's work. While the car is on the home road, the block will remain in its proper pigeon hole; when it leaves it is removed precisely as the card system calls for, and the block goes to a pigeon hole assigned to the road now having the car. This pigeon hole is divided once horizontally and 10 times vertically, thus again permitting the location of the car, this time by the last figure. Cars above the horizontal division are those 15 days and over on the line; those below less than 15 days. It takes 15 minutes each day to make the transfer from below to above of cars going over the 15-day limit.

The use of this system gives the following advantages:

1. At all times we know where the cars are. The eye takes in the situation quickly at a glance, and at the same time notes the kind of cars.

2. It furnishes a sure check on delayed cars on our line. The block of the car whose movement is last recorded goes on top in its pigeon hole, and thus the blocks of the delayed cars gravitate to the bottom.

3. It is fully as fast as books, if not faster. We have found it more rapid.

4. It enables one to better distribute labor economically. In the winter, foa example, when flat cars are idle and other cars busy, the spare time of a record clerk can be utilized, since two can work at the case without conflict, one ou the home movements, the other on the unction cars.

5. We can furnish a location statement of all our equipment 15 days and over and less, and show the various kinds of cars in 45 minutes.

6. It does away with all labor formerly employed on ledgers and cards, since the ordinary record force is sufficient.

7. It enables tracing to be done without interfering with the work of the record clerk. The list for tracing is constantly confronting one.

8. As the entire record is kept on the block, a missing receival of a car from a connection plays no part in the manipulation of the block. It would go to the home case after the first movement of the car on the line. It thus avoids errors of the cards or ledger.

9. After the first cost of case and blocks it is fully as cheap as books.

10. Transfers are distributed equitably and not made at the end of a month or two months; consequently, the record does not drop behind.

11. It enables higher officials by a personal visit to gain at any time a perfect idea of car location. It has been so used in our office repeatedly.

A Big Wire Fence.

Messrs. Barkley & House have made a contract to build a wire fence 20 miles long and 9 ft. high, having 16 wires, to inclose a part of Dr. W. Seward Webb's property in the Adirondacks. It is quite possible that this contract will be extended to cover the whole 60 miles bounding this property.

Power Station for the Columbian, Intramural Railroad.

The progress in the use of electricity as a motive power for heavy traffic is a matter of great interest to railroad men. Several electric companies have taken up the problem with more or less success, as indicated by the results of the experiments they have made. Probably the heaviest regular service so far attempted is that upon the City & South London Railway mentioned in the *Railroad Gazette* of April 4 and Nov. 21, 1890, and other issues. This is an underground road 3¼ miles in length, and was opened in November, 1890. Locomotives are used which weigh 10 tons and haul three car trains, seating about 100 persons per train. The total weight of loaded train, including locomotive, is about 42 tons, and the average speed attained over the line with four stops about 15 miles an hour. The power for this road is furnished by three vertical engines of 375 indicated horse power each.

Another road lately constructed, and performing a somewhat similar service, though under different conditions, is the Liverpool Overhead Electric Railway, which was quite fully described in the *Railroad Gazette* of Feb. 17. This is an elevated road 5¾ miles long, and supplied with power by four 400-H. P. engines. The trains run on this road consist of two cars, with a motor mounted on an axle at each end of each train. The weight of the loaded train is about 40 tons, each car carrying 56 persons.

Arrangements are being made, we are told, to equip the elevated roads of Berlin for operation by electricity. The details of this scheme are not yet settled, but it is without doubt the largest and most complete plant of the kind yet projected. It is not expected that the change to electricity will be completed in less than two or three years from this time.

American electricians have given considerable attention to this subject, although as yet no heavy trains are in regular operation. Street car lines alone show the actual development here. The General Electric Company has for some time past been engaged upon the plans and construction of electric locomotives for the Baltimore Belt Railroad at Baltimore. The framework of this locomotive has been completed, and it is expected that the motors will soon be put in place. The same company has also paid considerable attention to the design of a locomotive for suburban service. A number of these have been completed, and one was tried on the Boston & Maine last summer with very satisfactory results. Negotiations are now in progress between this company and the management of the Alley Elevated road in Chicago for a trial of one of their locomotives in elevated service. It is understood that the Baldwin Locomotive Works are completing an electric locomotive after the designs of Sprague, Duncan & Hutchinson, of New York City, for the Northern Pacific Railroad.

The Western Dummy Railroad Company is completing at Jackson Park, Chicago, an elevated electric road, which is far in advance of anything yet attempted. This is known as the World's Fair Intramural road. This has already been referred to somewhat at length in the *Railroad Gazette* of May 27, 1892, and March 31, 1893.

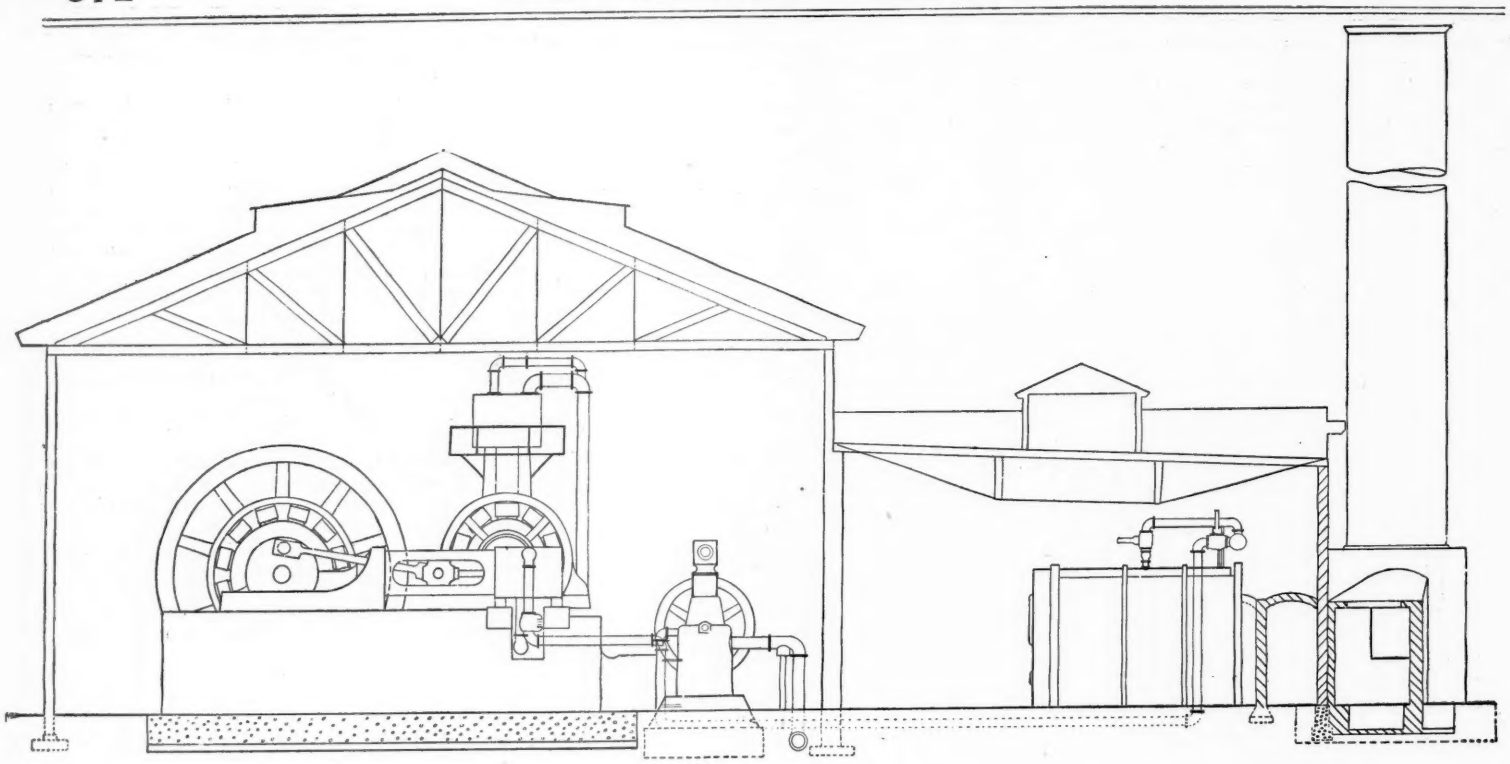
This is a double-track road about three and a half miles long, with loop terminals, which winds among the buildings in such a way as to afford quick and convenient transportation between parts of the grounds. The road is to be operated, upon its completion, by the Columbian Intramural Railway Company.

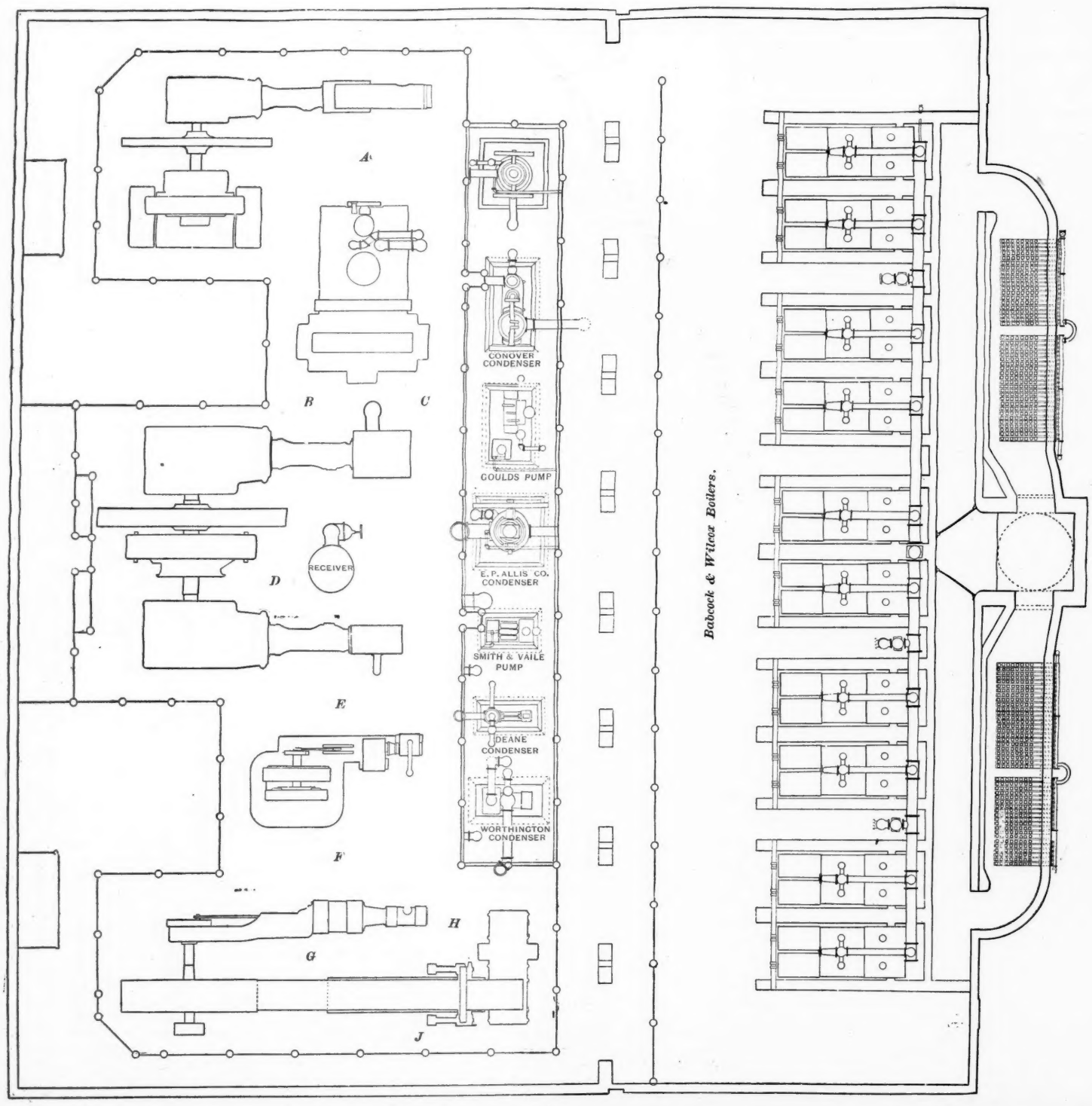
The power station is one of the finest exhibits at the Exposition, and for its design much credit is due to Mr. B. J. Arnold, Consulting Engineer in the railroad department of the General Electric Company, and his assistant, Mr. Hugh Hazleton. It is situated in the southeast corner of the grounds, convenient to water and fuel supply. The fuel for the boilers is oil from the Ohio oil wells. The tanks and pumping station for the oil supply of all the boilers at the Fair are located about 100 ft. from the intramural power station.

The general design of the plant will be clearly understood by referring to the plan and transverse section shown. In arranging the machinery, a special effort was made to so place each machine that the design and workmanship and the operation of each could be readily observed by the visitors from almost any location in the building, and the passageways were arranged to give the best accommodation possible. The railings prevent the spectators getting too near the dangerous parts, and leave ample room for the operators of the station to attend each machine and to pass from one machine to another without interference from visitors. The firemen are in the lower story, and so are separated completely from the visitors on the floor above.

On account of the temporary nature of the building, it was designed with the view of making it as cheap as possible and not detract materially from its appearance, and was arranged for exhibition purposes so far as other demands would permit. The rear wall between the boilers and the stack is of brick, and with this exception the building is of frame and staff construction.

The engine and generator room is 140 ft. long, 80 ft. wide, and about 25 ft. in the clear below the trusses. The floor of this room is about 10 ft. above the surface of the ground, thus allowing a basement of that height. The trusses of the roof over the engine room are of wood and of 80 ft. span, spaced 15 ft. on centres. They are supported at each end by 12-in. square pine posts extending from the lower chord of the truss to the footings.





A, 22 in. and 42 in. × 48 in. tandem compound Reynolds-Corliss engine; *B*, Thomson-Houston 750 K. W. M. P. dynamo; *C*, 22 in. and 44 in. × 36 in. Hammond-Williams vertical compound; *D*, 1,500 K. W. Thomson-Houston M. P. dynamo; *E*, 32 in. and 62 in. × 60 in. cross compound Reynolds-Corliss engine; *F*, 13 in. and 23 in. × 22 in. McIntosh and Seymour tandem compound engine and Thomson-Houston 200 K. W. M. P. dynamo; *G*, 20 in. and 38 in. × 48 in. tandem compound improved Greene engine; *H*, belt tightener, Eclipse Clutch Works *J*, Thomson-Houston M. P. 500 generator.

COLUMBIAN, INTRAMURAL RAILROAD POWER STATION.

The footings for these posts are shown in the section. The roof is made of corrugated iron laid on pine sheathing, matched and laid with the smooth side down.

The boiler room is 140 ft. long, 49 ft. wide, and one story high. The roof is made of three layers of tarred roofing paper upon which is placed a common tar and gravel roofing and is supported by trusses. The walls of the entire building are covered with grooved pine lathing and plastered inside and outside with diamond plaster, which, when dry, presents a hard, smooth, white finish. The exterior ornaments are of staff, the same as used on the other buildings.

How to support the 2,800 tons, the estimated weight of the machinery and its foundations, in sand which is submerged in water all the time, and which under some conditions takes the nature of quicksand, on a foundation sufficiently firm to withstand the exceptionally severe strains put upon it, owing to the extreme fluctuations of power at short intervals experienced in electrical railroad work; and how to keep the cost of the foundation within what it was thought best to spend upon the construction for six months' work, was the most serious problem. The following is the method adopted. An excavation was made 3½ ft. deep and the length and width of the building, leaving a surface of sand submerged in water. Over this surface were placed two layers of 3 in. by 12 in. hemlock plank laid at right angles to each other and well spiked. This was covered with a concrete bed 3 ft. thick and 135 ft. long by 60 ft. wide, of the following composition: One part American Portland cement to four parts of sand and four parts of broken limestone, thoroughly mixed and rammed into place. This brought the foundation about level with the surrounding ground. On top of this bed were built the foundations for the engines. These foundations are 10 ft. high and are of brick, laid in cement mortar, consisting of one part American Portland cement to three parts of sand. The flooring of the engine-room is level with the top of the engine foundations, leaving a large basement in which the pumping machinery will be placed. This arrangement places a load of about 700 lbs. per square foot on the sand under the foundations.

The engine equipment is as follows: One 22×42×48 Reynolds, tandem, compound Corliss engine, built by the E. P. Allis Company, of Milwaukee, located in the extreme east end of the engine-room. This engine is coupled direct to a 500-kilowatt multipolar generator and will develop from 750 to 1,000 H. P. at a speed of 80 revolutions a minute. Next west of this is a 22 × 44×36 cross-compound, Hammond-Williams, vertical engine built by the Lake Erie Engineering Works, of Buffalo, N. Y. This engine also is coupled direct to a 500-kilowatt multipolar generator. It will run at 100 revolutions a minute and develop from 750 to 1,200 H. P., depending on the load required. Just west of the Hammond-Williams engine and standing in the middle of the engine-room is a 32 × 62 × 60 cross-compound Reynolds-Corliss engine built by the E. P. Allis Company. Its shaft is direct coupled to a 1,500-kilowatt multipolar generator. This combined machine will run at a speed of 80 revolutions per minute and is expected to develop from 1,500 to 2,000 H. P. This is the largest electric generator yet constructed. The main shaft upon which the armature is built is 24 in. in diameter, 30 ft. long, and weighs 55 tons. This shaft was built by the Allis Company at Milwaukee and was brought to the Exposition grounds on a specially constructed car furnished by the Chicago & Northwestern Railway Company. The armature is 14 ft. in diamete r and was shipped in parts to the power-house, and will be erected and wound in place. In the west end of the building is a 20 × 38 × 48 tandem, compound, Green engine built by the Providence Steam Engine Company, of Providence, R. I. It is belted direct to a 500-kilowatt multipolar generator and will run at 100 revolutions a minute and develop from 750 to 1,000 H. P. The belt is 48 in. wide and furnished by the Page Belting Company. Between this engine and the one driving the immense generator stand, a 13 × 23 × 22 McIntosh and Seymour, tandem, compound engine coupled direct to a multipolar 200-kilowatt generator. This engine and generator will run at 150 revolutions and develop from 300 to 400 H. P.

All of the electrical machinery of this plant, as well as the motors of the cars, were furnished by the General Electric Company from the Lynn and Schenectady factories.

Referring to the plan it will be seen that the condensers and boiler feed pumps are arranged in a row back of the engines and are surrounded by a gallery for spectators. This room contains the following: Two vertical Allis jet condensers and air pumps attached to the two engines furnished by that company; one Conover jet condenser and air pump coupled to the Williams engine; one Worthington duplex jet condenser coupled to the Green engine; one Deane single-acting jet condenser coupled to the McIntosh and Seymour engine; one Smith-Vaile duplex boiler feed pump, which is also used for fire purposes, and one Goulds Manufacing Company's triplex boiler feed pump.

In the boiler-room are 10 Babcock and Wilcox water tube boilers having a rated capacity of 3,000 H. P., but capable of developing 5,000 H. P. when supplying engines running condensing, as all those in the engine-room are. Outside the rear wall of building is the smoke flue e ading to the stack, and on each side of the stack are two batteries of Green's fuel economizer, through which the feedwater from the pumps will be forced before entering the boilers. The dampers are so arranged that the gases may be turned either directly into the stack or through the economizers.

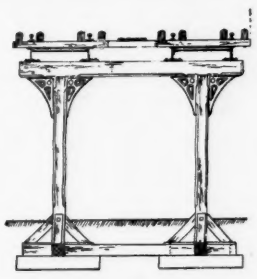
In the west end of the boiler-room are the small pumps, standpipes and other necessary devices for pumping and delivering the fuel oil to the burners under the boilers. The pumps take the oil from the large tanks through 2-in. pipes, and by means of the standpipes maintain a constant pressure of about 5 lbs. per square inch on the burners. A test will be made to determine the relative efficiency of the oil burners, and also, if possible, the relative cost of coal and oil for fuel in boiler plants.

The water is obtained from the lake through an 18-in. pipe laid with the power-house end lower than the lake end, so the water flows by gravity to the station, where it is raised 8 ft. by the air pumps, and after passing through the condensers is delivered to another pipe through which it flows by gravity to the lake.

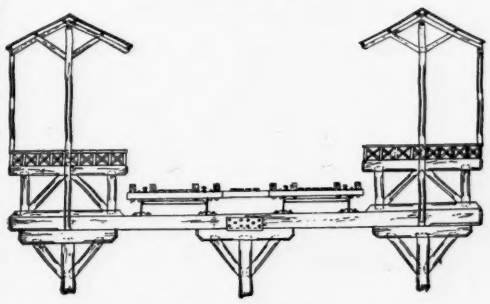
A main steam header 14 in. in diameter extends the entire length of the boiler plant, and to this the steam from each boiler is led through 7-in. pipe. From the main header there are three independent leads supplied with valves, and from these leads are branch lines to the engines, condensers and pumps. Thus it will be seen that the plant need not be shut down on account of accident to any particular part of the pipe.

On account of the temporary construction of the building, the pipe-work and other parts are supported independently of it as far as possible.

In the middle of the north side of the building stands the switchboard on a half-story above the engine-room. The officer in charge of the station is stationed on this platform, and, by means of speaking tubes and electric bells running to various parts of the engine and boiler rooms, can direct the entire work of the plant without leaving the platform.



Section on main track.



Section at station.

Structure of the Intramural Railroad.

NOTE: A conductor rail should be shown between the inner guard rails. It is carried on 6 in. × 6 in. blocks, these on 2 in. insulating spools.

It is expected that this plant will show as great economy as has yet been obtained in electric railroad work. It will operate 18 trains weighing from 65 to 85 tons each. Each train will be equipped with one motor car and from two to three trailers. Each motor car is supplied with four single reduction motors attached one to each axle, each motor having a maximum capacity of 125 H. P., or a total of 500 H. P. to each motor car, although the normal rating of the motors is but 50 H. P. each. The trains will run on a two-minute headway over a track with many sharp curves, and grades varying from ⅓ to 1⅓ per cent.

The current is supplied to the trains through a third rail, weighing 60 lbs. per yard, laid about 18 in. to one side of the track. This rail is supplemented with one or two additional rails, where the quantity of current to the distance demands it. The return circuit is made through I-beams, which support the structure, supplemented by the main track rails. The current is taken from the rail by two sliding shoes or trolleys attached to the trucks of each motor car. The block signal system is that of the Rowell-Potter Safety Stop Company and has besides the usual semaphores, an arrangement for applying the air brakes in case the engineer runs past a signal.

Sectional elevations of the structure are shown. This structure, as will be noticed, is very simple, consisting of two upright 12 in. × 12 in. posts framed into a cross sill, braced at the bottom in each direction and fitted into a cap at the top 12 × 15 in size. Upon these cap pieces rest I-beam girders which carry the track. The engravings do not show the location of the conducting rail, which is somewhat higher than the track and about 18 in. from the inner rail, except at switches and cross-overs where the conducting rail is necessarily placed outside. There are insulating blocks upon which the conducting rail is carried, and feed wires which supply current to the rail from a main wire suspended beneath the track.

The trains are equipped with direct-working air brakes of the New York Air Brake Company's design, and air is supplied by a small trunnion pump connected to a small single reduction motor. The system of brake leverage includes a small air cylinder, which, when brakes are applied, takes up the slack, the larger cylinder being depended upon for all braking force required.

There are at present two four-car trains in constant operation and running at intervals of 20 minutes. Although, in many instances, the management of the road have had no precedent to guide their work, no serious difficulties have been developed in the operation of the plant.

Mr. W. E. Baker, General Manager of this road, is taking especial care in keeping complete records of the performance of this plant, which will be of great interest to the engineering profession.

Railroad Balance Sheets.

BY AN AUDITOR.

Prior to making an investment in any business, whether incorporated or otherwise, it is prudent and wise to ascertain its value. To do this, correct statements of assets and liabilities are essential. In the case of the purchase of real estate it is usual to exercise great care; the actual value is ascertained (not the cost); the title is examined into the rental determined, etc. But as a rule in the matter of corporations, the public take the representation of interested parties or go it blind in the purchase of stock, notably in those issued by railroads; governed somewhat, however, by previous quotations and the financial condition of the country. At present the ruling factors being considered by speculators and investors in railroad stocks are the gold exports to foreign countries and the prospect of increased earnings on account of the increased traffic caused by the World's Fair; the former tending toward lower prices, while the latter tends to higher. The actual value of the properties and the fact that the revenue from the regular travel may be largely decreased by cutting rates are ignored. Buyers make a plunge and take the gambler's chance. In fact the majority of the brokers located in the vicinity of the Stock Exchange know but little more than the speculators, having become so much confused by false and misleading statements made in the past, and by fictitious values given to stock by the support of interested parties, that they are governed almost entirely by the *on dits* of the day. The exceptions to this are the trust companies and great banking-houses which negotiate large loans and promote the issuing of and subscribe for bonds.

The balance sheet should show the assets and liabilities, with the profit or loss, as the case may be, to balance. The liabilities are generally correct, for obvious reasons, and must be met. The assets, on the other hand, are often stated at amounts far above their real value and are misleading in many particulars. Cost of road is stated in dollars and cents and indicates to the average man that the sum named was expended in cash for the construction of the road, bridges, etc.; but the facts are that the discount on stock and bonds is debited to this account, or the stock and bonds are given to a construction company for building the road, the accounts for those securities being credited and construction debited without a cent of cash being paid, and the actual cost, so far as the railroad books show, being an unknown factor. Interest often accrues on the bonds and is payable before there are any earnings, and is also charged to cost of construction. During the war and for many years after, when both labor and material were very high on account of a depreciated currency, charges to this account were made as of date, in currency, and no road has ever charged off anything on account thereof, so far as my knowledge goes. Furthermore, rails have been decreasing in price for many years because of new and cheaper methods introduced in their manufacture, so that at the present time they can be purchased at $30 a ton, while formerly they cost from that to $100, and were so charged to the cost of road. Other charges have often been made to this account by unscrupulous managers; for example, legislative expenses.

The equipment account is also overcharged because of the high prices during and subsequent to the war. In addition to that, many roads will persist in charging new cars that are to replace old ones to equipment account instead of expenses. The American system of charging off nothing to depreciation, because they claim that by repairs and renewals both the road and equipment are kept as good as new, would seem to be fair in theory, but there are few roads in this country whereon you will find no inferior track and no old, worn out cars and locomotives.

The item of advances to leased and controlled lines is seldom of real value—at least, not available. The stocks and bonds of other companies of course fluctuate in value, and their real worth can only be determined by having specific knowledge. The remaining assets are

generally fairly stated, though material on hand and bills receivable are often doubtful. The amounts involved, however, are not large.

From the foregoing in relation to the charges to cost of road and equipment, it is evident, if the assets in question were reduced to their real value, that the surplus or credit to the profit and loss account appearing on most of the balance sheets of our railroads would be wiped out and a large debit to that account, or deficiency, would appear. It is true that some roads, notably the Pennsylvania, have been charging betterments to expenses and thereby kept down the item of cost of road, and it is also true that some of the Western lines have approximated their true value by the great rise in real estate in the large cities, for which they paid but little. These are, however, exceptional cases.

The Reading road was shown by the *Railroad Gazette* to be bankrupt as far back as March, 1887, upon the basis of its own annual report, taking all assets as worth what they were charged at; yet strong hands took hold of it, pushed up and maintained the price of its stock, and sought to control nearly the whole East on its credit. They held out a good while, but it collapsed; so, too, the Baltimore & Ohio with is boasted forty millions of surplus—on paper—built its extensions and then came to grief.

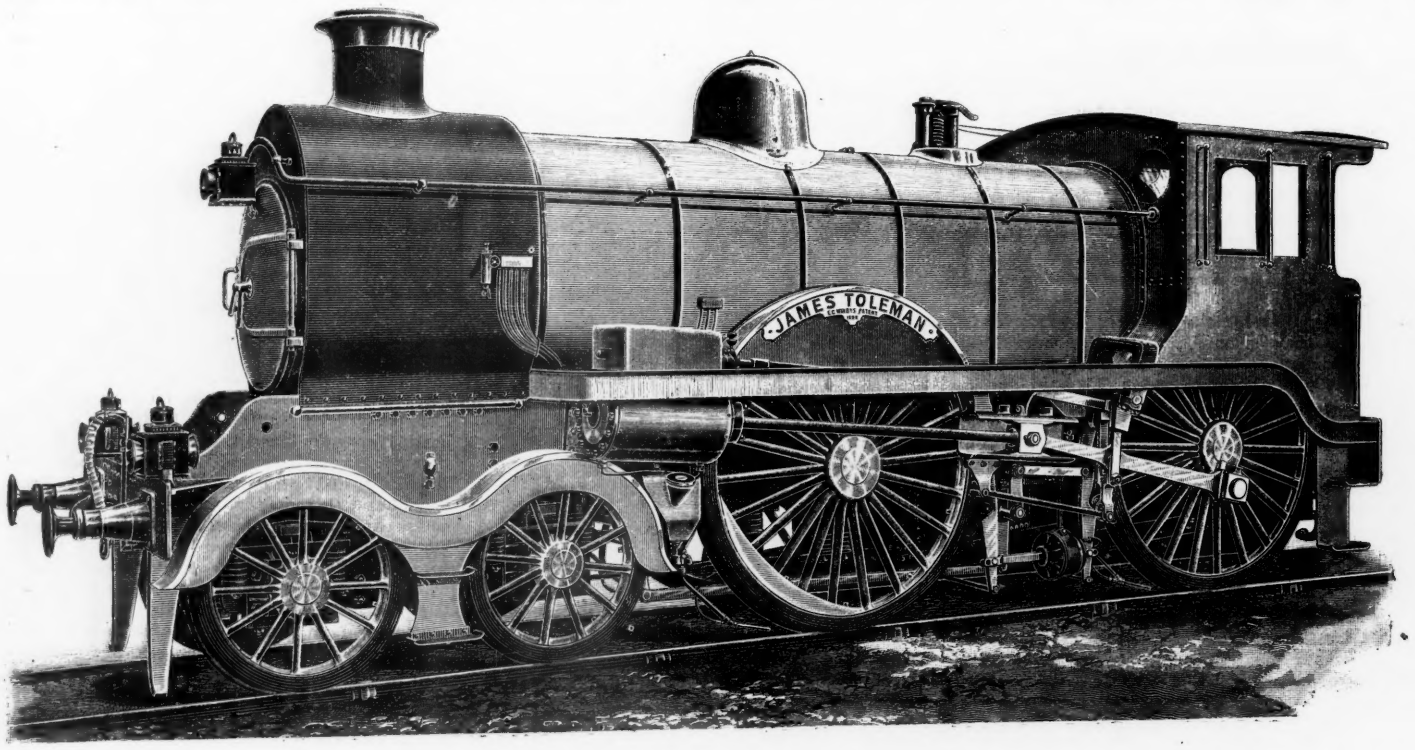
Would it not be well for railroad companies to take the people into their confidence and say, our liabilities are so much, the real value of our assets is approximately so much, and the deficiency so much, which we will square up out of earnings as soon as possible, and start on an even keel? They have gone on in the old rut so long that it is doubtful whether any in control have the nerve or manliness to do this of their own volition. It is more than probable they would say, this is true, but, "what are you going to do about it?"

It is not what a road has cost that the stock and bondholders and the people want to know; it is its value in gold, and this will not be given except by legal compulsion. This matter is so important and so far reaching that the various commissions, national and state, should take it up. If I mistake not, the Interstate Commerce Commission has authority to act in the matter.

Winby's Four-Cylinder Locomotive.

Among the novelties shown at the World's Fair is an express locomotive designed by Mr. F. C. Winby, and built by Messrs. R. & W. Hawthorn, Leslie & Co., of Newcastle, Eng. A perspective is shown in this issue reproduced from *The Engineer*. The locomotive has four cylinders, but works single expansion. The forward cylinders are placed inside the frames and drive the front drivers. The other cylinders are placed outside and connected to the rear drivers. The inside cylinders are 17 in. × 22 in., the outside cylinders 16½ in. × 24 in. The inside cylinders are worked by the ordinary link motion, and the outside cylinders by the Joy valve gear. The drivers have cast steel centres and are 7 ft. 6 in. in diameter. The total wheel base is 24 ft. 8 in. The boiler shows in cross section parts of two intersecting circles one above the other, the diameters being 4 ft. 2 in., and their centres 17 in. apart. At the intersection of the two circles there are stout cover strips, and through these pass horizontal cross stays from one side of the boiler to the other. The section of the barrel thus obtained is equivalent to an ordinary cylindrical boiler about 5 ft. in diameter. There are 235 brass tubes, 2 in. outside diameter and 14. ft. 9¾ in. long. The firebox is 8 ft. 3¾ in. on the inside and 3 ft. 4½ in. wide at the bottom, the sides sloping inward slightly as they go up. It extends to an extreme depth (outside) of 6 ft. 8¼ in. below the centre of the boiler. The firebox runs forward underneath the barrel of the boiler, the tube plate being about the middle of its length. It has a firebrick arch, and this firebrick extends under the portion of the boiler which overhangs the firebox. The firebox is of copper. The total heating surface is 2,000 sq. ft., 1,817.4 sq. ft. in the tubes and 182.6 in the firebox. The grate area is 28 sq. ft. The working pressure is 175 lbs. per sq. in. In working order the engine weighs 25 tons on truck, 18 on the leading wheels, and 17 on the trailing wheels. The engine has steam and hand reversing gear by which both sets of valve gear are operated simultaneously. It is fitted also with the Westinghouse quick acting brake and Gresham & Craven's steam sending apparatus.

Detail drawings are shown in *Engineering* and *The Engineer*.



WINBY'S EXPRESS LOCOMOTIVE—SHOWN AT THE WORLD'S FAIR.

A Compromise System of Live Loads for Dimensioning Bridges.

Last November Mr. J. A. L. Waddell sent out a circular letter following up the discussion opened in his well known paper on "Certain Disputed Points in Railroad Bridge Designing," and inclosing a ballot to get an expression of opinion on the various points raised. He now issues a circular reporting the result of the ballot, and another ballot on a proposed compromise standard system. The ballot itself we do not reprint, as it will be received by most engineers who are likely to be interested in the subject, and as copies can be had by addressing Mr. Waddell, Keith & Perry Building, Kansas City, Mo.

The original ballot was sent to 253 engineers. Answers have been received from all but 93; making the percentage heard from 63, not heard from 37. Out of the 160 heard from 20 had not the leisure to investigate the subject; 11 professed not to be posted on the points raised; 18 were opposed to balloting on such matters, and 111 sent in ballots. Mr. Waddell gives the following percentages of those balloting and not balloting:

	Railroad Engineers.	Bridge Engineers.
Not answering	54 per cent.	43 per cent.
Not having time	65 " "	35 " "
Not posted	82 " "	18 " "
Opposed to ballot	39 " "	61 " "
Balloting	42 " "	47 " "

In the latter class also there were 11 per cent. of those responding from other branches of the profession. The result of the ballot is given below.

Item No. 1.

19. In favor of adhering to the concentrated wheel load method of computing stresses, which is now in vogue.

16. In favor of adopting a constant car load per lineal foot headed by a single locomotive excess-load.

3. In favor of the latter, except that they specify two locomotive excess-loads.

69. In favor of adopting the method of "Equivalent Uniform Loads" advocated by Mr. Waddell in his paper on "Some Disputed Points in Railway Bridge Designing."

Item No. 2.

75. In favor } of adopting a system of train loads simi-
16. Not in favor } lar to that proposed by Mr. Waddell on pages 89 and 90 and Pl. XVI., of the *Transactions* of the American Society of Civil Engineers, Vol. XXVI., modified by the addition of certain heavy concentrations for short spans, as indicated on page 272 of the same volume.

32. In favor } of increasing the wheel loads for tenders,
32. Not in favor } given on said Pl. XVI.

15. In favor } of increasing the lengths of engines as
41. Not in favor } their weights are increased.

16. In favor } of increasing the loads on the engine axles,
45. Not in favor } given on Pl. XVI.

10. In favor } of the addition of train loads for mountain
57. Not in favor } lines in which the engine loads shall be heavy and the car loads light.

14. In favor } of abandoning the loads proposed by Mr.
55. Not in favor } Waddell and substituting therefor others.

Item No. 3.

108. In favor } of having made, at the expense of either private parties or the U. S. Government, an exhaustive set of experiments to ascertain the dynamic effects of live loads applied at various speeds on bridge members of all kinds.
None Not in favor }

Item No. 4.

106. In favor } of having made, at the expense of either private parties or the U. S. Government, an elaborate series of tests of full size members of steel bridges, especially compression members of all kinds.
2. Not in favor }

Item No. 5.

98. In favor } of the *ultimate* adoption by the profession of standard specifications for bridge designing which shall specify clearly and concisely, in every particular, such important matters as loads, intensities of working stresses, quality of materials, workmanship, etc., but at the same time shall not infringe upon the individuality of the designer.
6. Not in favor }

From the preceding Mr. Waddell draws the following conclusions:

Item No. 1.

Of those who voted on this question about 18 per cent. are in favor of adhering to the concentrated wheel load method, and 82 per cent. are in favor of abandoning it. And of the latter about 22 per cent. are in favor of substituting a uniform car load headed by one or two engine excesses, and 78 per cent. are in favor of adopting the "Equivalent Uniform Load" method. This indicates very clearly that a large majority of American engineers interested in the subject are in favor of abandoning entirely (except, perhaps, for ascertaining stresses in existing structures) the burdensome method of computing stresses by the use of concentrated loads, and substuting therefor the much simpler method of "Equivalent Uniform Loads." As soon as a set of live loads for railroad bridges is decided upon by the engineering profession, I shall, with the shortest possible delay, prepare diagrams of end shears and equivalent loads, and distribute the same to all engineers interested.

Item No. 2.

It appears that my proposed system of train loads has met with general approval, but that certain changes therein are advisable. Opinion appears to be pretty equally divided as to whether the proposed loads on axles of tenders should be increased. The increase recommended in weight on one axle varies from 1,000 lbs. to 4,000 lbs., average being about 2,400 lbs. One gentleman made a very good suggestion, viz., that the weight per foot of the tender should not be less than that of the cars. If this suggestion were adopted, the increase would vary from 2,300 lbs. to 3,000 lbs. per axle, the average being about 2,600 lbs. From letters received from several of the gentlemen who balloted, I am convinced that my weights on tender axles are too light; consequently I have determined to increase each of them by 3,000 lbs., leaving the weights on the leading wheels of the locomotives unchanged.

The wheel spacing adopted appears to be satisfactory to most of those who balloted, although perhaps causing a small error on the side of safety; consequently it will not be changed in the proposed "Compromise Standard."

Although the general opinion is that my proposed loads on main axles of engines are heavy enough, nevertheless

I consider it better to increase each one by one thousand (1,000) pounds.

The question as to whether special loads with lighter cars are advisable for mountain linesseems to be settled conclusively in the negative.

It must be remembered that for very short spans there are heavier concentrations in the proposed standard than those indicated for the consolidation engines, and that these heavy loads are not adjusted so as to give the same bending moments, at any particular span length, as do the consolidation engine loads. It will be seen later, on the diagrams of equivalent loads, at what span for each class the special, heavy loadings begin to exert more effect than do the consolidation engine loadings. By comparing the special, heavy loading on the accompanying ballot with those suggested on page 272 of my paper, it will be seen that I have made a slight change therein. This was done for the sake of uniformity and to avoid fractions of 1,000 lbs.

Gold's Terra Cotta Storage System of Steam Heating for Passenger Cars.

The radiator in the apparatus here shown is made of terra cotta, 4¾ in. in diameter and in sections 1 ft. long, placed within iron tubing 5 in. in diameter and from 16 to 20 ft. long. Each 12 in. section of terra cotta will hold 3 lbs. of water. When steam is turned into the tubes the condensation is immediately absorbed by the terra cotta, and by this means sufficient heat is stored to keep a car comfortably warm several hours after the steam is shut off. By storing heat in this way an equable temperature can be maintained at all times. When a car is heated to the desired temperature, say 70 deg., the steam may be shut off and the car will remain agreeably heated in the coldest weather from one to three hours.

From the sectional view, fig. 3, it will be seen that the steam supply pipe to the heater is run through a groove in the upper side of the terra cotta. It delivers the dry steam to the further end of the heater, the condensation therefrom being carried back to the opposite end through smaller grooves in the terra cotta and thence through a small pipe to a trap underneath the car, the warming of the car and the storage of heat thus commence simultaneously.

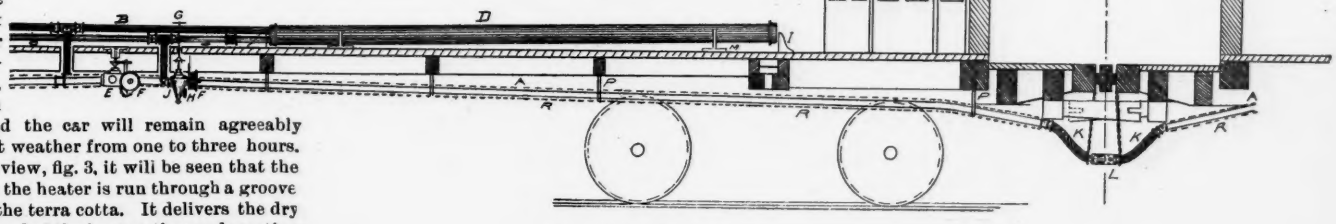


Fig. 1—Side Elevation.

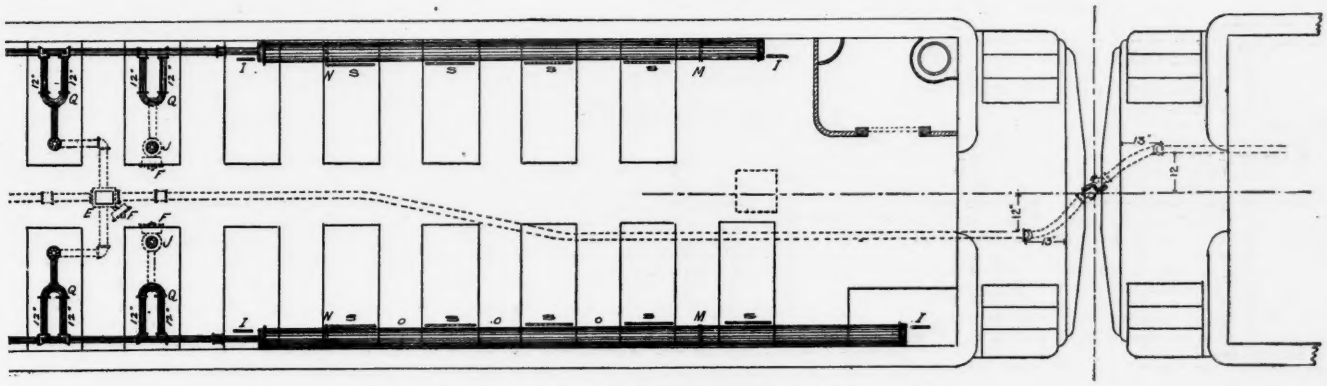


Fig. 2—Gold's Terra Cotta Storage System of Steam Heating for Cars.

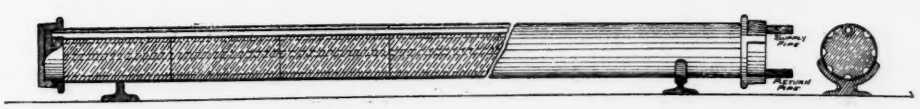


Fig. 3—Sectional View of Gold's Terra Cotta Storage Heater.

The heaters are placed so as to be highest at the ends of the car and to drain toward the centre. The connecting pipes at the centre of the car are very short so that the heaters are quickly and easily applied to a car, an important item when there is scant time to put cars in the shop. The entire apparatus is supplied by the manufacturer.

The steam is taken by two 1 in. branch pipes from the main supply through Gold's train-pipe valve at the centre of the car, each side being entirely independent of the other. There are two steam valves used, one for each side, placed at the end of the seats where they can be easily operated without disturbing the passengers. There are also two Gold's thermostatic traps with blow-off valves. The coupling shown in the accompanying cut is Gold's straight port coupling, which connects with the Sewall. The Gold company has two other types, one of which connects with the Gibbs coupling.

Standard Trucks and Foundation Brake Rigging.

At the last meeting of the New England Railroad Club the President announced as the subject for discussion for the evening, "The Desirability of Having Standard Trucks and Foundation Brake Rigging for Freight Cars and the Influence this Would Have on Repairs," to be be opened by Mr. John N. Lauder.

Mr. LAUDER: I think we all probably agree that it would be very desirable to have standard freight-car trucks on the roads, and also standard foundation brake rigging, on many accounts, especially in the matter of repairs. I presume the time will never come when we shall have absolute uniformity in freight-car trucks on the different roads in this country. The reasons for this are various, the main one being that every man wants his particular notion carried out as to what he believes to be the best freight-car truck. For myself—and I think I could speak for our road in this matter—in order to bring about uniformity in this matter, I would be willing to adopt any truck in its entirety that might be adopted by the Master Car Builders' Association. I think it is the duty of that Association to agitate this question until they bring about a result which everybody must admit is desirable. . . .

The argument may be advanced that we ought not to have a standard, because we have a variety of cars, some carrying greater loads than others. I think that argument would have no force, because the cars, without regard to their peculiarities of construction, or what they were designed to carry, are to-day all practically from 40,000 to 60,000-lb. cars. Now, if we should adopt a truck that would be ample in strength to carry a 60,000-lb. load with its car safely, I think we should find it desirable to do just what we did when we adopted the standard axle. When that was adopted it was for the heaviest loads. It has been said we should have two standards, one for lighter loads; but in the course of time the manifest desirability of having a standard axle was so pronounced that we gradually dropped into the standard for everything, and the wisdom of that course is shown in the facility with which repairs are made to-day when there is anything to do to the wheels or axle.

Now a word in regard to what ought to be adopted as the standard truck. The discussion naturally drifts into a discussion of the merits of different kinds of trucks, though this is somewhat foreign to the subject. As to the Fox truck, which is creating a good deal of interest all over the country, and is being largely introduced, experimentally and permanently, I think it has come to stay, and that it is going to make headway. I think it is the best truck running. The only out about it is its slightly increased expense over very fairly good trucks. If that truck is to come into use to any extent we ought to insist that every detail of it, no matter what road it is going on to, should be absolutely standard and uniform. Now I have sent blue prints and had my Fox truck made in accordance with my notion, and the result is that a number of things are different—different centre, different side bearings, etc. These things ought not to be. If this truck is coming into use quite largely every road that puts under one set should have it like every other set in the country in all the details. . . .

Those who find that a swing-motion truck is desirable under a car of course would not be satisfied with the Fox truck. I had at one time an idea that a car should have a swing-motion truck. I think a car will last longer and have less deleterious effect upon the track with such a truck than with a rigid truck; but I believe as our track becomes more perfect the difference in the wear and tear of the track by reason of using a rigid truck will gradually disappear. I think to day there is no particular advantage in a swing-motion truck under freight cars 35 or 40 ft. in length. The cost of repairs is very much less in a rigid truck, as the parts in a swing-motion truck are continually wearing and have to be watched carefully, and the inspection of a swing-beam truck is much more of a job than the inspection of an ordinary rigid truck. If my position in this matter is correct that objection to making the Fox truck a standard is done away with.

Mr. Adams used to argue with a good deal of force and good judgment that he had the best truck in the world, what is known as the continuous frame truck, or the Boston & Albany truck. There are a great many good things about that truck, chief of which is that it furnishes a good arrangement of brake hangers, furnishes something to hang your brake on, without hanging it to the body of the car, which is objectionable from every point of view. You can hang it on to the outside of the wheels and have something substantial to attach it to. Perhaps the best reason for advocating a truck of that kind is that the entire structure is on springs, while the majority of other trucks, the diamond and all of that class, are bolted rigidly to the box, so that every jar, from defective roadbed or defective wheels, is transmitted directly to the truck structure, and it is impossible to prevent the bolts and nuts from getting loose, while with the Boston & Albany truck that will not occur to so great an extent, because the whole structure is on springs, and the springs absorb the jars to a certain extent. The Fox truck has all of those advantages I have mentioned as belonging to the Boston & Albany. . . .

Now, as to the question of uniformity of the foundation brake rigging, it is important, especially in connection with repairs. . . . In fact, there can be but one argument, that in favor of absolute uniformity in the running gear of freight cars, both as to the trucks and the foundation rigging.

Mr. MARDEN: This is a question in which there is no chance for an argument on the negative. . . . The matter of swing motion in a freight truck is a question not yet fully agreed upon by heads of departments of different roads. I have a firm belief in the swing-motion truck for freight cars, although there are more repairs required on it than on a rigid truck. At a slow rate of speed, on a good road, I don't know that it is quite as desirable as it is at the high rates of speed at which we are inclined to run our freight trains and on grades and curves. Whether the truck should have the bolster bangers, or whether the side motion should be obtained by some other device is yet a question in my mind, but f we can have a truck that will give us that amount of motion we now attain by the swinging, and as strong as the rigid truck and less liable to give out, I think it will be very desirable.

The standard foundation brake rigging is just as desirable as regards uniformity as the truck. . . .

The foundation brake rigging, where it has been adopted in part, if not in whole, by the Master Car Builders' Association, I think should be made uniform on all our freight cars and our passenger cars as well. And I will go further than that, and say that uniformity in all the parts that are interchangeable about a car would mean a good prospect of paying large dividends on the savings that might accrue to the different roads.

Mr. ADAMS: I can see a good many things that stand in the way of getting a standard truck, while I am convinced that it would be a most desirable thing, and it would undoubtedly add to the dividends of our roads, if these obstacles could be overcome. . . . Mr. Lauder alluded to the Boston & Albany truck in a very complimentary manner. We have abandoned that truck simply because it costs too much. While our officers all concede that it is the most economical truck that can be run, there is this point about it: We are running our own cars but very little, taking the whole business; we run ten foreign cars to one of our own, and while we did build trucks that cost more than the Fox truck, they went off of our road, and somebody else got the benefit of them, of that good construction and diminished repairs. We are taking the wear and tear of the poorer trucks that come to us, and paying the expense of it. So, on considering the matter, we thought we were doing too much for our neighbors, and we would adopt a truck that is in general use all over the country. I conceded this at once in conversation with our manager; I said that was our true policy. Consequently we have adopted the diamond truck, which is the cheapest made, the rigid diamond truck, and we endeavor to get a truck as strong as possible in that shape, and we think we have got an excellent one. We recognize what Mr. Lauder has alluded to as to repairs on our old style of rigid continuous frame truck. That is unquestionably an economy in the minds of mechanics, but the first cost of that truck is so great it is an important item in the aggregate, the trucks for a thousand cars adding $60,000 to their expense. That is an obstacle to bringing the Fox truck into general use. The great mass of managers of railroads, I think, will consider that point carefully before they consent to that, when they know there are cheaper trucks running through the country doing a good, fair business, without any serious objections, and they will probably conclude to use the cheaper truck.

There is a very strong tendency on the part of railroad men of the present day, and I am sorry to say it seems to be growing, to take advantage of other roads than their own, and not do what they ought to do in the way of repairs of cars that come into their construction department. For instance, ever since the adoption of the uni-

form standard brake arrangement prescribed by the Association, we have been endeavoring to make ours exactly like that, of the same dimensions. Our cars go on to Western roads, and they come back with perhaps a lever or so wrong and so put in as to destroy the effect of the power brake. This thing is done continually, and the trouble is that you cannot tell where it is done. The inspectors say we are at fault in receiving such a car, but we cannot control any beyond our own inspectors; the car has perhaps run over a good many roads, and we do not know who fixed it, and all we can do is to put it back into shape before we send it out. This same difficulty would exist with a standard truck; as soon as those trucks got on to a road where repairs were required somebody would change something not conforming to the standard.

Mr. KOLSETH (of the Westinghouse Air Brake Co.): Some four or five years ago the Westinghouse Co. adopted a standard lever and pin. The Master Car Builders' Association took up the matter and increased the sizes which the company recommended, thereby increasing the wearing surface. I have found within a month a car running into Boston that had the company's brake and the standard holes in the Westinghouse equipment, but a $\frac{5}{16}$-in. pin. The pin was all doubled up. With a pin of that size in an inch hole there would be about 1.5 in. movement on each beam that is taken up by the piston travel before the brake is applied at all, and you can't take up the brake without excessive piston travel. There is no use of having a standard if even the Master Car Builders of New England will not follow it closer than that. Six months ago I was called upon by a certain road where some new cars were to be built and equipped with the air brake. In looking over the brake rigging I found that the levers were of the right proportion with regard to the weight of the car, but the lever and pin were too small, having been made before the standard was adopted. I called their attention to that; they had let out their order to an outside party to make the levers and pins, and I went to that party and told him they must be standard. I went to the road again in about three months to see that the brake was all right; the brake rigging was all there, but I was surprised to find that the levers were just the same as they were on the old cars. They had sent a car for a sample, and the general manager had ordered 50 or 100 cars to be built exactly like that, and in consequence they built the levers the same as on that car without regard to whether they were right or wrong. In that case they were wrong. If you adopt a standard and do not follow it more closely than that I don't think it will benefit you much.

Mr. LAUDER: It seems to me that some of the arguments which have been presented here as to the difficulty of adopting a standard freight car truck are really in favor of it. I don't believe that the officers of our roads in this country are blind or foolish. I think they are in favor of having what is most economical to run. . . . I think, as Mr. Marden does, that we have got to adopt some construction outside of railroads themselves in order to secure a standard; and in a little while, if the railroads want to do their own work, they will naturally come in and build the same thing. I don't stand here to advocate the Fox truck except in the line in which Mr. Marden argued. It is a truck adopted by some of the large roads; we have 200 of them running, and so far I think it is the best truck I ever saw. It has the standard axle, it runs free from hot boxes, and so far it is giving us splendid satisfaction. Furthermore, I see no reason why that truck should not run a hundred years without repairs; I don't see where any wear can be made, provided that once in four or five years it be cleaned up and painted.

Mr. MARDEN: Mr. Adams complained of the trouble he had experienced from the substitution of parts of the tracks on his cars when undergoing repairs. With regard to the Fox truck, it is impossible to substitute any part different from the original, except perhaps in the matter of journal bearings.

Mr. ADAMS: In what I said I did not have reference to the construction of the truck itself. The frame of the truck is not disturbed ordinarily; the trouble is generally with the brake rigging. We have some 3,500 cars with power brakes on them, and they come home frequently with old levers, old pins, old connections put in, wrong sizes, where they had originally the Master Car Builders' standards. I suppose these cases could be looked up and we could find out where these things were done, but the trouble would be more than it is worth.

The "Rocket" at the Rainhill Trials.

BY W. M. ACWORTH.

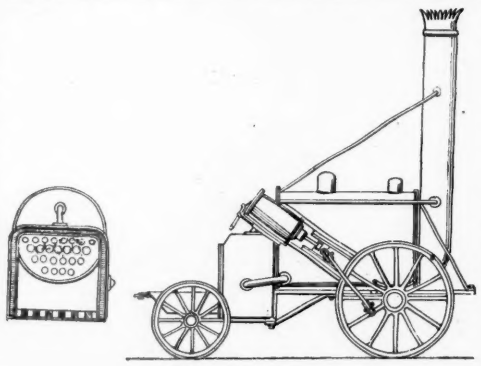
[We have reproduced from Nicholas Wood's book three of the Rainhill engines described by Mr. Acworth.—EDITOR.]

The assertion of "Locomotion" in the *Railroad Gazette* of March 31, that the "Rocket" as she first appeared at Rainhill, on Oct. 6, 1829, had neither blast pipe, multibular boiler, nor rectangular firebox, has startled me into spending some time in examining the accounts of contemporary authorities. The result may perhaps be of interest to your readers, if only as showing how difficult it is to arrive at certainty in railway history, modern though it be. Broadly, in every one of the three particulars, "Locomotion" is quite wrong, and your assertion is quite right.

I have consulted the following strictly contemporary publications: (1.) The second edition of the "Practical Treatise of Railroads," published in 1831, by Nicholas Wood, of Killingworth, one of the judges at Rainhill. (2.) The "Account of the Liverpool & Manchester Railway," published in 1830 by Henry Booth, treasurer of the company. (3.) The *Mechanic's Magazine*, vol. 12, whose editor, Robertson, was present at the trial. This magazine contained papers contributed by Vignoles, the celebrated engineer, who was on the "Novelty," of which he was part owner. (4.) The "Life of C. B. Vignoles, by His Son," which contains extracts from his diary. (5.) "Railways and Steam Carriages," an article in the in the *Quarterly Review* for March, 1830. The author of this article was, I am informed, a Mr. Buchanan, an engineer, not a regular contributor, which would seem to show that he was chosen for special qualifications. All these five authorities give a picture of the "Rocket" showing distinctly the separate firebox and the pipes along the top of the boiler carrying the waste steam from the cylinders into the lower part of the chimney. Wood gives a second engraving showing the square firebox attached to the boiler half way up, and the tube plate with 26 holes, though his text agrees with the rest in saying there were only 25. Wood's engraving is interesting in another respect. It shows distinctly the pipes into the bottom of the firebox casing for supplying water from the boiler, and a single pipe leading obliquely out of its square top to let the steam back into the boiler. In all the other books, Zerah Colburn's included the picture has got blurred; the steam pipe has vanished and reappears half as a purely gratuitous excrescence on the end of the cylinder, and half as a sloping top of the firebox itself. If the *Railroad Gazette* could reproduce Wood's pictures, I am persuaded we should have the facsimile of the original "Rocket" of the Rainhill trials.

So much for what the "Rocket" was like. It is a more difficult question how she came by her various peculiarities. As for the "square box, or furnace," as Wood calls it, it seems to have sprung full grown from the head of Stephenson. Henry Booth makes no claim to it and I can find no trace of such a thing on any early engine, all of which had, I believe, the fire inside the flue of the boiler. Presumably too there were firebox stays; and yet, though the fixing them must have taxed the skill of the Forth-Bank fitters, no mention of them is anywhere to be found.

In reference to the multi-tubular boiler the evidence is clear. The *Quarterly* says that the "Rocket" "included many striking improvements. . . . The heated air was made to pass through a great number of small pipes running longitudinally through the boiler. . . . The 'Rocket' boiler was the invention of Mr. H. Booth, of Liverpool." Mr. Booth himself, in the work already mentioned, says that the "Rocket" was "built by Messrs. Robt. Stephenson & Co., of Newcastle, with a boiler of a new construction suggested by the writer of this account," and again:



The "Rocket."

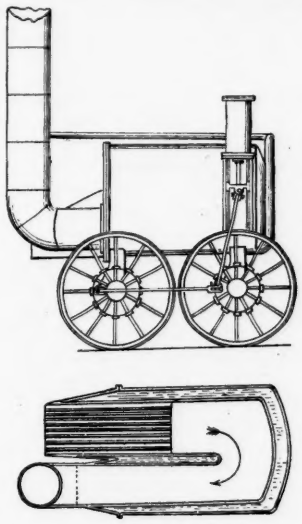
"The directors awarded the premium to the writer of this account and the Messrs. Stephensons, to whose excellent construction of the machinery I was much indebted for the favorable award of the umpires." In a memoir of Mr. Booth privately printed by Wyman & Sons, London, in 1869, this claim is amplified by him in a letter to Mr. Smiles. "I was," he says, "in almost daily communication with Mr. Stephenson at the time, and I was not aware that he had any intention of competing for the prize, till I communicated to him my scheme of the multitubular boiler. . . . When the conditions of trial were published, I communicated my multitubular plan to Mr. Stephenson and proposed to him that we should jointly construct an engine and compete for the prize. Mr. Stephenson approved the plan and agreed to my proposal. . . . I am ignorant of M. Seguin's proceedings in France, but I claim to be the inventor in England, and feel warranted in stating without reservation that, until I named my plan to Mr. Stephenson, with a view to compete for the prize at Rainhill, it had not been tried and was not known in this country." Mr. Booth's claim was, it may be added, entirely indorsed by Robert Stephenson. But as M. Seguin has been mentioned, who undoubtedly did patent a multitubular boiler in 1828, and as on this M. Lobet, in his "*Chemins de Fer en France*," bases the statement that "England, as usual, appropriated the invention," it is well to mention also that in 1826 Mr. Neville, an Englishman, patented a multitubular boiler. It may be further added that engineers, from Trevithick downward, and including among them George Stephenson himself, had for years past been experimenting with tubes, usually, however, vertical rather than horizontal, and more with the idea of bringing tubes filled with water into the middle of the fire than tubes filled with fire into the middle of the water. Mr. Joseph Kirwan, civil engineer, writes in his "Descriptive and Historical Account of the Liverpool & Manchester Railway," published in 1831, that "neither Mr. Booth nor the Messrs. Stephenson can fairly lay claim to any novelty of invention on this account. The use of tubes has long been a favorite project with steam engine improvers, and the boilers of Mr. Booth and the Messrs. Stephenson differ in no respect from many others that might be named, except in the extraordinary number of the tubes they employ. The tubes in the 'Northumbrian' amount to no less than 150."

It is impossible to credit Hackworth with the original idea of the steam blast, or even to suppose that he first directed Stephenson's attention to its advantages. Trevithick's original engine of 1803 had a pipe turned into the chimney on purpose to blow the fire, and therefore christened by him a "blast pipe." "Puffing Billy," as built by Hedley in 1813, had two blast pipes, one from each cylinder, but they made such a noise that an intermediate reservoir was put in two years later to intercept the escaping steam. The Killingworth engines, dating from 1815, and "Locomotion" of the Stockton & Darlington line, opened in 1825, all were Stephenson-built, and all discharged their steam into the chimney. To suppose, therefore, that the steam blast came into existence with the alteration of the "Royal George," in 1827, is entirely impossible. Mr. Vignoles, on the other hand, tells a story that the discovery of the steam blast was a mere accident, and vouches Mr. Locke, the great engineer, and another engineer, Mr. Wellington Pardon, who only died in 1889, as his authorities: "One of 'Old Geordie's' workmen at Newcastle advised his master to allow the escape steam, which generally surrounded the engine driver with its dense mist, to go off through the chimney, instead of from underneath the boiler, the suggestion being strengthened by the man's declaration that it would look so much better." Probably the account given by Nicholas Wood on page 293 of his first edition, published in 1825, will reconcile the apparent contradiction. At first the steam blast was necessary, it being "difficult to produce steam in sufficient quantities"; but then boilers and flues were enlarged and engines steamed more freely, and had no difficulty in supplying steam enough for coal trains traveling at six or eight miles an hour. So, partly because its noise was objected to, partly because it was unnecessary, the blast dropped out of use, to be brought back again in an improved form as soon as engines about half the size of the colliery locomotives were required to run at thrice their speed. Putting all the accounts together, it would seem that the "Rocket," as it arrived at Rainhill, had two blast pipes, each contracted at the nozzle, and that either during or after the contest, and possibly in imitation of the "Sanspareil," the two pipes were combined into one before entering the chimney. In the Liverpool *Times* of Oct. 27 it is stated that "a considerable alteration has been made in Mr. Robert Stephenson's engine, which has greatly increased its powers." And again, on Nov. 7, the *Mechanics' Magazine* reports that "On Saturday last Mr. Stephenson's engine, which has received several material improvements since the late competition, exceeded all its previous performances in an extraordinary degree. It drew after it, on a dead level, 40 tons, at an average rate of 14 miles an hour, being more than three times the weight which it drew at 12½ miles an hour when competing for the prize. It afterward drew 18 tons up a plane having an inclination of 1 in 96 at the rate of eight miles an hour."

Let me just add that the "Rocket," as she appeared at Rainhill, was painted yellow and black, with a white chimney, which "from its great height, gives a swaying motion of the engine from side to side;" that William Gowland had charge not of the "Rocket," but of the "Sanspareil," while, according to Lieutenant Le Count, of the London & Birmingham Railway, who, in his "Practical Treatise on Railroads," published in 1839, speaks as though he had been an eyewitness, "on the day of the trial the 'Rocket' was managed by Mr. James Stephenson, an uncle of the maker," a brother, that is, of George. Let me notice, further, that it was the "Rocket" that ran over and killed Huskisson, on the occasion of the formal opening of the line a year later, and then let us pass on to say a few words about the other competitors.

Timothy Hackworth—he is called by the *Mechanics' Magazine* Ackworth, and in one place Acworth—had, we are told, "advanced all his means in the building of the 'Sanspareil.'" This engine, which appeared at the contest painted green, yellow and black, had a blast pipe which sloped upwards from the cylinders to the chimney to allow the condensation water to "fall back through the vertical branch pipe at its lower extremity into the feed pump." It had a single flue commencing at the front end of the engine, where was the fire, running to the back, turning round there, and then returning to the chimney. Consequently it had its tender in front as well. As to why it broke down, the *Mechanics Magazine* says, "one of the feed-pipes burst." Nicholas Wood amplifies this by saying that "in traversing the eighth trip to the west, the pump that supplies the boiler with water got wrong, which checking the supply, the water in the boiler got below the top of the tube and melted the lead pipe inserted for the purpose of preventing accidents in such a case, which put an end to the experiment." Mr. Vignoles and Mr. Booth ignore the "Sanspareil." Zerah Colburn, however, states—he does not tell us on what authority—that the cylinders, which had come from Stephenson's Newcastle works, were badly cast, and in straightening them one of them was bored so thin that the steam cracked it alongside the stern-port, and that the "feed pump stopped" after the engine had been working some time in this disabled condition. Mr. D. K. Clark, in his "Railway Locomotives," improves on this and says that "no sooner had the engine commenced working than one cylinder burst, when the race had to be run with one perfect cylinder only, while the fracture of the other opened at every stroke a direct communication between the boiler and the blast pipe. The fuel was then dragged from the firebox in solid pieces and was

blown unconsumed through the chimney—a result which sufficiently explained the inferior economy of fuel." It is very remarkable that, if all this really happened, none of the observers noticed it, and that Wood, himself a judge, declares that the disproportion between the draft of the blast and the area of heating surface "sufficiently accounts for the great difference in the economy of fuel between" the "Sanspareil" and the "Rocket."



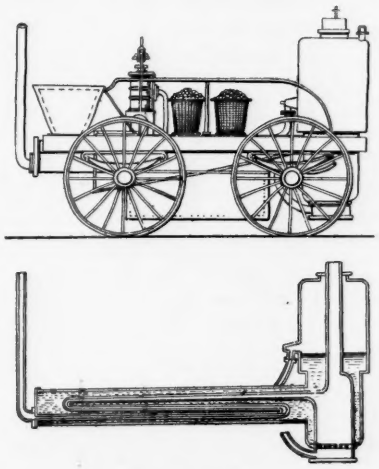
The "Sanspareil."

Be this as it may, certain it is that the "Sanspareil" was beaten; her builder "gladly accepted the offer" of the Liverpool & Manchester directors to purchase her for the stipulated price of £550, and she was set to work on the adjacent Bolton & Leigh Railway, which, though nominally independent, was practically a branch of the Liverpool & Manchester. There shortly afterward she made a record performance. Up an incline of 1 in 72 for a mile and a half she drew 15 tons at nine miles an hour, while she drew 4¾ tons at a somewhat higher speed up an incline of 1 in 30 for a mile and a quarter. "We apprehend," says, however, the *Quarterly Review*, which tells the tale, "that we must consider this as an experiment made under favorable circumstances rather than as the ordinary and every-day work of the engine; it is sufficient, nevertheless, to prove the very great power of these machines."

Of the "Perseverance," which is usually left unmentioned because it did not actually compete for the prize, it must just be said that "the boiler and furnace, instead of occupying the same carriage with the rest of the machinery, are placed on a separate carriage attached to the hinder part of the other." Mr. Burstall, its builder, anticipated, therefore, by a good many years the patent of Mr. T. E. Harrison, whose "Thunderer," built in 1837 for the Brunel and "Great Western" will be found fully described and illustrated in Nicholas Wood's (third) edition of 1838.

But far more important than the "Perseverance," more important probably at the moment to those actually present than the "Rocket" itself, was the "Novelty" of Braithwaite & Ericsson. According to the Liverpool *Chronicle*, though the "Rocket" well deserved the £500, "the grand prize of public opinion" went to the "Novelty," and it was tolerably certain that "the principles and arrangements of this London engine will be followed in the construction of all future locomotives." The "Rocket" was, says the *Quarterly Review*, "in every respect the most perfect" engine of the ordinary kind, but the "Novelty" "must, without doubt, claim the pre-eminence as a masterpiece of ingenuity and mechanical skill," as being "so vastly superior in lightness, elegance, the perfection of its machinery, and the form, arrangement and compactness of its various parts." The chimney "not rising above seven feet from the ground . . . will admit of a reduction of seven or eight feet from the height of the mason work in every bridge under which the engine must pass. . . . What a saving must this produce in the original cost of a railway through a cultivated country where these bridges must frequently occur." Mr. Borth himself was compelled by generosity to admit that the "Novelty" was "a beautiful machine," while Nicholas Wood has placed on record his conviction that "the failure of the 'Novelty' engine at the Liverpool experiments arose . . . from no defect in the principle, but only in the construction," and further that "theoretically considered this mode of generating steam (by what we nowadays call forced draught) is more economical in point of fuel than in engines the fire in which is kept up by the rarefaction in the chimney." Finally, Mr. Vignoles states that Mr. Locke told a friend of his that "George Stephenson at once regarded the 'Novelty' as the only possible rival of the 'Rocket,' and gave immediate orders to those about him to look well to the purity of the water in the cask placed upon the tender attached to his own engine and to the quality of the coke for fuel."

How the "Novelty" repeatedly broke down at the trial, justifying Stephenson in saying to Locke, "Eh. mon, we needn't fear yon thing; it's got no goots" [guts]; how the bellows went wrong on Oct. 6, and again next day; how on Oct. 10 "a small pipe gave way, no forge was at hand and a message had to be sent to Prescot (two miles off) to procure what was necessary for repairs;" how on the 14th the cement on the boiler flanges gave way, for reasons fully explained by Nicholas Wood, and she was finally withdrawn from the competition—all this must be passed over with only the briefest notice. But it is worth recording that, according to Vignoles, who was on the engine*, she ran on Oct. 10 at the rate of 30 miles an hour, while the "Rocket" never got much above 24 miles.† Her economy of fuel, too, was considered remarkable, as she burnt only from a halfpenny to three farthings, worth of coke per mile, while the "Rocket" burnt fully double the larger amount. Messrs. Ericsson & Braithwaite were evidently more than satisfied with their engine's performances. They declined the directors' offer to buy her, being, we are told, "under an impression that it might seem their engine was bought less for its merits than on account of its misfortunes;" but they accepted an order for two more engines on the same principle, to be delivered by the following 15th of June; and they took the "Novelty" back to Liverpool for a thorough overhaul. One of the improvements they made was that a separate cylinder was applied for working the bellows.‡ And apparently the result was most satisfactory, for a correspondent of the *Mechanic's Magazine* writing from Liverpool on Dec. 17 reports that the "'Novelty,' having undergone a thorough repair . . . . has been going the whole day with the greatest success . . . . In several hours her rate of going averaged full 40 miles per hour." And again, four days later, he writes that the engine "drew for several hours a gross weight of 35 tons, that is at least ten times its own weight, at the rate of 12 miles per hour." Ericsson himself reported to Braithwaite in reference to the experiments on the 17th: "Everything has gone extremely well. . . . We went at various speeds throughout the day, and the steam was kept up in wonderful style. The engine did not exceed 260 strokes per minute, not quite 40 miles an hour; and I am confident that, if I dare trust the *force pump* at such a rate, I could have done *one mile in one minute*. As the engine passed on in its velocity the spectators cheered in a glorious manner."



The "Novelty."

The contract for the two improved engines of the "Novelty" pattern was for delivery not later than June 15, 1830. But the day came and they were not ready. It was then hoped that at least they would be able to take part in the ceremonial opening of the line on Sept. 15. "But these engines not having arrived from London early enough to be subjected to a preliminary trial, the directors thought it would not be prudent to allow them to make part of a procession which it was of the utmost consequence should be exposed to as few risks of failure as possible."§ They were named—and, "by special permission of his Majesty," be it noted—the "William the Fourth" and the "Queen Adelaide." On Tuesday, Sept. 21, the "William IV." "made its appearance at the Manchester end of the line and exercised for two or three hours. On Wednesday it made the trip to Liverpool in two hours and twelve minutes (deducting stoppages), and on Thursday evening again exercised as at Manchester for about an hour on the level between Edgehill and Olive Mount. It is an engine of about 20 H. P. (the cylinder 12 in. stroke 14) and to all appearance perfectly capable of performing all the work which Messrs. Braithwaite & Ericsson have contracted it shall perform, namely, drawing the enormous load of 40 tons at the rate of 15 miles an hour. The external appearance of this engine is remarkably elegant and excites general admiration. The saving of fuel by this engine is, we understand, incredible." The following day "William IV." set off back to Manchester to rejoin his royal consort who had not yet ventured to leave her shed. On the Sankey viaduct it came to a point where the rail had subsided an inch and a half and incontinently ran off the road, burying its wheel up to the axlebox in the soft ballast. Mr. Kirwan, so he tells us, the moment he received the intelligence, gladly availed himself of the offer of a seat in a horse railway car, and reached the scene of the accident about daybreak. There he found "William the Fourth" tied by rope to a tree growing on one side of the embankment, in order to prevent it from tumbling down the other, in which case it was fated—to judge by the very rough sketch which Mr. Kirwan's much harrowed feelings alone enabled him to produce—to fall upon and sink a barge flying full sail along the Sankey Canal underneath.

A fortnight later our author noted that "one or two improvements" have suggested themselves to Messrs. Braithwaite & Ericsson, since witnessing the practical difficulties which Messrs. Stephenson & Co.'s engines have to encounter," but these gentlemen "profess to entertain as confident an expectation as ever of their being able to fulfill their contract; and from what we have ourselves seen of the engines we have no hesitation in saying that it appears to us to be an expectation perfectly well founded."

And with this sanguine forecast we may appropriately leave the subject, for of these engines I can find no later trace. They are not mentioned in the detailed list of Liverpool & Manchester engines published in 1840 by Wishaw. Of the "Novelty," indeed, we catch one later glimpse, in Vignoles' diary under date May 30, 1838: "This day for the first time I went with a locomotive on the rails just laid over the new Ribble Viaduct. The engine used was the 'Novelty,' which was conducted by my son Hutton, who also regulated the steam, proud exploit for a boy of fourteen." Perhaps some American friend or pupil of Ericsson can supplement this fragmentary chapter of railroad history.

POSTSCRIPT.

In my account of the engine trials at Rainhill I unaccountably omitted to notice the description published by Robert Stephenson and Joseph Locke, dated Liverpool, February, 1830.* That description, however, I am glad to say, confirms in almost every particular the account I have already given. There is one exception; the picture of the "Rocket" is the usual one, showing a sloping-topped firebox instead of the square top given by Nicholas Wood. It seems odd that Wood should be correct and the builder of the engine incorrect, and yet I still cling to my belief in the explanation which I have given. It should be noticed that Stephenson and Locke wrote "firebox" in inverted commas; that the thing was evidently a new one with a strange name. On the subject of the steam blast they make this distinct statement: An augmentation of the temperature of the fire "was effected, shortly after the first locomotive engine was tried on the Killingworth Colliery Railroad, by conveying the steam into the chimney, where it escaped in a perpendicular direction up the centre after it had performed its office in the cylinders. . . . The effect was to increase the draft." They then go on to show that in "locomotive engines on the principle of the "Rocket" . . . by this contrivance for augmenting the draft . . . an increase of power does really take place as the velocity of the engine is multiplied." Surely sufficient proof that Stephenson didn't need to wait for Hackworth to teach him at Rainhill the advantage of a blast pipe.

"The appearance of the 'Novelty'" the rival engineers confess to be "very much in its favour; the machinery is ingeniously contrived to work out of sight and the whole forms as compact a machine as can well be imagined." Of the final breakdown of this engine they write as follows:" In the second trip the pipe which conveys the heated air from the furnace through the horizontal boiler collapsed and the steam, forcing its way into the fireplace, was evolved from the bottom of the furnace into the atmosphere. This failure was at the time attributed to the yielding of a 'green joint,' but having seen the pipe when it was taken out we feel convinced that its failure alone was sufficient to account for the accident, without the addition of any joint giving way.' In reference to the failure of the "Sanspareil" and the title of Mr. Booth to be regarded as the inventor of the multitubular boiler, Messrs. Locke & Stephenson entirely support what I have already gathered from other sources, but as they give nothing new I need not cite them.

* Wood's 29 miles an hour, which is copied by Smiles, is a mere mistake of arithmetic. His own figures give 1½ miles in three minutes 44 seconds, which is equal to 24.1 miles an hour.

† There was another great engineer on the engine. The "engine-man" was Fox, afterwards Sir Charles, the builder of the great Exhibition of 1851 and of the Crystal Palace.

‡ Originally the bellows (which, by the way, the *Quarterly Reviewer* describes as "a sort of bellows or blowing machine," while Mr. Vignoles, Junior, frankly talks of a "fan,") were "worked by the engine"; but how I have failed to make out either from the descriptions or the drawings.

§ My authority for what follows is the pamphlet published in March, 1831, by Joseph Kirwan, Civil Engineer. He was an eyewitness, apparently, of the scenes he describes, and claims to have "been at some labour to collect from every accessible source of information on the subject." He gives a picture of "William the Fourth," an improved "Novelty" with a much larger steam generator and boiler. The bellows have disappeared. The cylinders drive the front instead of the hind wheels, and there is a tender in front whose wheels run loose on the axles.

* My copy of this work is an American reprint by Carey & Lea, Philadelphia, 1830, containing also Mr. Walker's report on "The Comparative Merits of Locomotive and Fixed Engines," and Mr. Henry Booth's "Account of the Liverpool & Manchester Railway." The "Advertisement to the American edition" says that "the description of this stupendous undertaking will prove to our readers that the difficulties to be surmounted were without parallel and consequently afford no data for estimating the usual cost of railroads. . . . *The two items* (of bridges and land) *alone exceed the whole estimated cost of the Pennsylvania Railroad from Columbia to Philadelphia, which is nearly thrice the length of this road.*"

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

There is a great shaking up among the car couplers this spring, and we doubt not that the ultimate results will be wholesome. Three sets of exhaustive tests of couplers have been made or are making at this time: Those of the Western Railway Club, which are both drop and pulling tests; the Master Car Builders' drop tests at Altoona, and the Master. Car Builders' pulling tests at Watertown Arsenal. We are not at liberty to publish such results of these tests as have come to us already, and indeed it would be unjust to do so, for no proper and fair conclusions can be drawn until the whole material is gathered and collated. All of the coupler makers, so far as we know, have sent couplers to be tested by the Master Car Builders' Committee, and most of them sent couplers for the Western Railway Club's tests; and the results will unquestionably give valuable information as to the quality of the material used, as to the relative value of different materials, and, to some extent, as to the strength or weakness of design of details. We understand that there have been some surprising results developed, and it is quite likely that there will be a considerable improvement in the quality of the material used in some of the couplers, as the results of these tests. It is probable, too, that there will be some change of opinion as to the value of laboratory tests. We imagine that the fact will appear that a good many uncertainties can be eliminated without the expense and danger of service tests. The results of the investigation now going on will probably be one of the most interesting matters presented at the coming conventions of the associations.

In the discussion before the New England Railroad Club, reported on another page, Mr. Adams advanced a somewhat novel argument against using expensive freight car trucks. He acknowledged that his truck, which was long standard on the Boston & Albany, was a good truck, but he says that the company has abandoned it because it costs too much, and has adopted the diamond truck. This step has been taken because the Boston & Albany runs ten foreign cars to one of its own, and, while "it did build a truck that cost more than the Fox truck, it went off the road and somebody else got the benefit of the good construction and diminished repairs. The company takes the wear and tear of the poorer trucks that cometo it and pays the expense." Is this good doctrine? It seems as if there must be a fallacy in it, for the rational deduction is, if your cars are off your own road more than half the time, you had better try to build a cheaper truck than your neighbor's, regardless of the increased cost of repairs. It would seem that if you build a durable truck you save repairs on the home line and save accidents, and in that way gain, whatever your neighbor does. You also save in those repairs for which you are responsible under Rule 8 while your cars are on foreign lines. Whatever truck your neighbor builds, the cost of repairs to your own truck is greater or less according to its durability, and is entirely independent of the cost of repairs to your neighbor's truck. To be sure, if you are building cars to let, and not to run on the home road, it may be profitable to make them just as cheap as you can and have them stand up long enough to be accepted. We are inclined to think that Mr. Adams was not correctly reported or else that he did not state the whole of his idea. We suspect that he found a great disadvantage in using a truck that was dissimilar from the trucks of the great majority of the roads with which he interchanged, making it necessary to carry a large stock of parts for repairs to foreign cars which were not available for repairs to his own. At any rate the point raised by him is an interesting one, and we should like to get some expressions of opinion upon it.

The passenger rate war between the Colorado Midland and the Denver & Rio Grande was settled last Monday by the Presidents of the Atchison, Topeka & Santa Fé (which controls the Midland) and of the Denver & Rio Grande, though the details of the agreement have not yet been reported. For about three weeks both roads had been carrying passengers to competitive points at very low rates, mostly less than cost, and they must have thrown away a good deal of money. It appears that the Rio Grande did not go so far as to meet the lowest Midland rate (.83 mill per mile), but, on the contrary, advanced the through rate of $1 to $2 on May 8. This war has illustrated the foolish extremes to which such contests were carried in the early days of reckless competition, and has even beaten most records, for the offices in Denver sold tickets after all the available cars were much more than filled. Fifteen hundred were sold in one day at one office and many people who could not get into the cars came back and got their money refunded. Trains on both roads were packed and people rode hundreds of miles standing in the aisles. As it does not greatly harm the other fellow to cut under his prices after his cars are filled, a traffic officer who is responsible for this kind of slashing will, we suppose, try to justify the expense by assuming that the advertising of his own road is a valuable result. But as the people who have enjoyed these rides had in many cases neither business, pleasure, nor health for an object, but only curiosity, it is very questionable whether the expenditure of money to make them acquainted with the road can be called justifiable. Will they ever travel at regular rates by reason of the taste of travel that they get now?

The question of rates of fare on the new fast train between New York and Chicago has been left to Messrs. William Bliss, President of the Boston & Albany, and A. J. Cassatt, a director of the Pennsylvania, they to call in a third arbitrator in case they cannot agree. Messrs. Walker, Goddard and Blanchard had evidently been unanimous in their opinion that the Pennsylvania's demand should be granted, and so, if these gentlemen were to be the arbitrators, the case was already settled when the meeting of last Friday convened; but it seemed to be agreed that a little more cushioning was desirable, and so this indirect method of postponement was adopted. The report of the Commissioners did not recommend an increase in the rates on the present 25-hour trains, as has been reported, but it did recommend an increase in case they should be quickened, the report reading as follows:

	Extra Fare.
Twenty-six hours or faster	$3
Twenty-four and one-half hours or faster	6
Twenty-two and one half hours or faster	8
Twenty and one-half hours or faster	10

The feeling between the New York Central and the Pennsylvania seems to be very amicable, as the Pennsylvania selected Mr. Bliss and the Central selected Mr. Cassatt. There is some speculation now whether the Pennsylvania will not put on a 20-hour train after the rate is settled. An article which appeared last week in a Philadelphia paper, bearing the ear-marks of the Pennsylvania's "literary bureau," indicates that it will not. The article is devoted to an explanation of the fact that although the Pennsylvania, with its much shorter line, can easily run trains from New York to Chicago in 20 hours or less, in spite of a few grades, its freight and general business is too heavy and important to be disturbed by a single train as seriously as would be the case with one running so fast that other trains would have to be side-tracked frequently and for longer times than under ordinary conditions.

The report of the Commissioners is evidently based on the assumption that the regular $20 rate between New York and Chicago is low, and that all changes should tend upward. Speed is quite sure to gradually increase—whether a 20-hour train goes on now, or not—and this is a plain declaration that rates ought to increase correspondingly. And from an operating standpoint the Commissioners are right. We need not say that they "assumed"—we may admit that their premise is a fact; for the through traffic, carried in heavy sleeping cars which are lightly loaded, doubtless pays much less than its proper share of the interest and dividends of any of the roads. Extra seats are provided in the dining car, and on the limited trains in the smoking car, so that, with the observation car added, and allowing for passengers who buy whole sections, it has been estimated that each passenger on the best trains has the use of three or four seats, while paying the railroad company for only one. But a consideration of the problem before the traffic department at once shows that this is a difficult theory to carry out, nevertheless. When it is said that "it is much easier to reduce rates than to raise them," no one thinks of finding a scientific basis for the statement, but it is a potent factor nevertheless, and it bears on this problem with full force, for the profit of a fast train depends, among other things, upon how many people it will take from the ordinary trains, and this in turn depends upon the *smallness* of the extra fare. In other words, an extra fare may easily be too large to attract a profitable trainload, and then, if the train is to be run without loss, the fare on ordinary trains must be increased. But that an increase beyond $20 on ordinary trains would be wholly out of the question "goes without saying." The disturbance of local rates and the complications with inferior lines would be at once declared by everyone insuperable obstacles. That an extra fare for high speed is quickly felt in the auditor's office is indicated by the statement, recently made, that the earnings of the New York and Chicago limited trains are a dollar a mile less than the average of the other through trains, and the extra fare is only $3. These trains have doubtless lost some patronage, however, by the quickening of other trains to within one or two hours of the limited time. A 20-hour train, being a novelty, and saving time for the passenger in that portion of the day when time is most valuable to him, may be very much more attractive than the 25-hour trains.

Making Rates by Law.

The recent convention of State Railroad Commissioners at Washington (see *Railroad Gazette* April 28) was mostly an experience meeting, and worked away on the old familiar lines of discussion without any very important results, so far as can now be seen. But if the deliberations of the commissioners convinced them of the extreme difficulty, and of the danger indeed, of trying to legislate for the control of the vast and complicated interests which they have to deal with, the convention will have been extraordinarily useful. In the report of the discussion considerable evidence appears that the notions of the commissioners are changing with experience. For instance, Mr. Duncan, of South Carolina, gave an account of the troubles of his State Commission in endeavoring to fix rates. Mr. Duncan had been on the Board for eleven years without solving the question, and he wanted the advice and experience of his brother commissioners. How did they make rates, and on what basis? "When the railroads complain that the rates are too low, and ask for an increase, what do you do?" In South Carolina they try to decide what the roads cost. Mr. Duncan's county subscribed $150,000 toward building a railroad, and is now paying a tax of three mills to meet that interest. The company put on a mortgage for the same amount, sold the road, and the county lost its money. Now, in making up a tariff for that road, should the commission include the county money or not? Another road cost $1,500,000 to build, yet it sold at auction for $308,000. Now, on what basis should the commission make up a tariff for that road, on $1,500,000 or on $308,000? Evidently Mr. Duncan was not inclined to pass lightly over Statistician Adams' first recipe of "ascertaining what income a railroad actually needs." This point has evidently troubled the South Carolina Commission for a long time. Doubtless too, other commissions have wrestled with such questions if inclined to base rates on the "actual-need" theory. "I have come here with a Macedonian cry," concluded Mr. Duncan; but his brother commissioners did not rush to his rescue with the knowledge or enthusiasm which he seemed to expect.

Commissioner Becker, of Minnesota, however, "sympathized deeply" with his friend from South Carolina, and he proceeded to give some large chunks of advice to that gentleman and to the convention:

"Money invested in railroads is no more entitled to protection than the private money of any individual. I object to an inquiry on the part of any commission in this country as to what a railroad costs. I do not care what it costs. It may have been economically built; it

may have been extravagantly built. I would never inquire how many bonds a railroad company had issued. They may issue all the bonds they can sell for all I care. That makes no difference. The men who invest their money in those bonds, if it is a good investment, will get the benefit of it, and if it is a poor one they will lose their money. The same with reference to capital stock. I should not inquire what amount per mile a railroad had invested in capital stock. They may issue all the stock they please, and water it all they please, so long as they find men to buy it. It is their lookout whether they have bought good stock and paying stock, or whether they have bought poor stock. And I will go still further and say that the expense which the railroad company is at to carry the freight or to manage its business affairs is a matter which does not enter at all into the question of what is a reasonable rate. I object most strenuously, as a citizen, against any form of authority which undertakes to say that the people of this country are bound forever to pay the interest upon the bonds of any railroad company by freight tariffs, or the dividends upon any stock by freight tariffs. I think that in looking at the question of reasonable rates we should not look at it from that standpoint, but we should look at it from the standpoint of a man who pays the freight, and see whether his business will justify it to be made."

Mr. Becker, it will be seen, argues against the theory which has been set up in several important suits, that a railroad company is entitled to charge such rates as shall enable it to pay interest on bonds and something on its stock. We also see that his dictum that rates should be such as the shipper's business will justify, is one which is apt to be interpreted against the carrier, and, indeed, has been so construed by a majority of the State Commissioners. Yet if it were fairly applied it would be a better basis for determining the reasonableness of rates than the more prevalent theory of cost of service with a profit according to capitalization. But in spite of this interesting debate we are afraid that the question of reasonable rates is still undetermined. Mr. Becker came very near recognizing the justice of charging what the traffic will bear; and that, as we all know, is a horrible principle to the average State Commissioner.

A request was made that the Interstate Commission push the matter of uniform classification vigorously. Statistician Adams spoke of it as necessary to further progress toward his theory of rate-making. Interstate Commissioner McDill, in a neat speech, complimented the convention on its interest in that subject, but proceeded then to state some of the difficulties which lie in the way of adopting that proposition, so that his position against the measure was hardly doubtful. Indeed, the proposal to have uniform classification over the whole country, with exception sheets for each state, showed how little the subject was really understood. The nation is now approaching uniformity in classification as fast as the different sections are approaching each other in conditions; and it is worse than useless to try to hasten the one faster than the other. Difference of classification is not a cause, it is an effect, of commercial differences already existing.

Prof. Henry C. Adams, Statistician to the Interstate Commerce Commission, read a paper before the convention. Most of this paper was printed in the *Railroad Gazette* of April 28. Mr. Adams advocated a cut-and-dried method of solving the rate problem. He would first ascertain what income a railroad really needs; then he would determine the cost of carriage of each commodity by dividing the expenses between passenger and freight service and then between commodities. He would thus theoretically ascertain what percentage of profit over cost of transportation was necessary in each case to bring in the required income, the amount of which would already have been determined by an estimate based on cost of road and other elements. It is strange to find so accomplished a man as Mr. Adams lending his support to a scheme so Utopian in character, and which if it ever could be carried out, would strike paralysis into industrial progress. But the convention had just recommended that no attempt be hereafter made to separate passenger expenses from freight, and we do not learn that any motion was made to reconsider that decision.

Uniformity of Air Brakes and the Breaking-in-Two of Trains.

An important fact about train brakes and one of the most indicative results obtained by Mr. Dudley in the West Albany brake trials is given in the data from the running trials Nos. 6 and 7 with mixed brakes. The record was given in the *Railroad Gazette* last week. The following are the results: Test No. 6, 25 Westinghouse brakes and 20 New York brakes; speed 27.75 miles an hour: length of stop 325 ft.; *train parted in two places*. Test No. 7, 25 Westinghouse brakes, 30 New York brakes; speed 30 miles an hour; length of stop 344 ft.; *train parted in three places*.

The important fact given in these results is the breaking-in-two of the train, which resulted directly from mixing the brakes, because the result of the mixing was to use brakes having a decidedly different type of action, in the same train. Those who have studied the results of the brake tests that have been made up to this time know, without further explanation, the cause of the breaking-in-two of the trains in the West Albany mixed trials, and also know that breaking-in-two is the necessary result of running trains with powerful brakes when all the brakes in the train have not very nearly the same rapidity and quality of action.

The explanation which follows is intended mainly for those who are not well read in brake matters and who are seeking for simple explanations of results; therefore, all of the more complicated reasoning about the causes of the breaking-in-two of trains is omitted.

For the purpose of illustration, let us assume a 50 car train equipped with hand brakes. Let the train be running at 30 miles an hour, and 25 brakemen be detailed to put on the brakes quickly on the 25 rear cars. The result would be that the train would break in two almost immediately after the brakes were applied, and at some point near the middle of the train, for the holding power of the rear brakes, taken together, is enormous. Likewise, the momentum of the front of the train is very great, as shown by Mr. Dudley's report. The pulling ahead of the front and the holding back of the rear produce a stress in the train that no coupler or draft rigging or car sill that has ever been made can withstand; necessarily then the train parts.

Let us now suppose that the front of the train alone has the brake applied; the result, for reasons similar to the foregoing, would be that the rear of the train would run into the front and cause damaging shocks and probably a serious wreck under the conditions we have assumed.

What would take place with hand brakes under the foregoing assumed exaggerated conditions takes place with air brakes in actual service when they do not act uniformly. The New York brake is a comparatively slow-acting brake; the Westinghouse brake a comparatively quick-acting brake. If the Westinghouse be put at the rear, the train would part, because the New York brake in front would not apply until later, and the rear of the train would hold back while the front was pulling away, and this would cause a break-in-two, just as has been illustrated in the case of hand brakes. If the New York brake be placed in the rear and the Westinghouse in the front the brakes would apply first at the front, and the rear of the train would run into the front, as in the case with hand brakes, and would cause a serious shock. Of course the worst conditions exist when all the quick-acting brakes are at one end of the train and all the slow-acting brakes at the other; but when the cars are mixed throughout the train and any number of quick-acting or slow-acting brakes are placed together in any part of the train, there will result an uneven action of brakes, and shocks will occur in some parts of the train, and the train will part at other points. This is just what happened in the running trials Nos. 6 and 7.

It would be a very severe criticism of railroad mechanical engineers and designers of draft rigging, couplers and air brakes in this country, if it was a fact that air-braked train could not be stopped, from a speed of 30 miles an hour, in a distance of 344 ft., without parting in three places, as was the case in running trial No. 7. That railroad devices are not in such bad condition in this country is shown by the results of the other running trials. It is impossible to make the brake action on different cars so uniform as to prevent breaking in two occasionally during emergency stops, but it is folly to use any devices or arrangement of parts, whether it be the brakeshoes, the brake leverage or the air apparatus, which will increase the irregularity of the breaking force throughout the train. The leading men in the Master Car Builders' Association fully appreciate this, and that is why they have appointed committees to report on a standard brake-shoe material and air brake action to go with the standard already adopted in the brake levers and brake beams, hoping thus to gain uniformity in braking power throughout trains that will not make it dangerous to stop quickly in case of need. It is just such results as were obtained in running trials Nos. 6 and 7 that the Master Car Builders' Association has been trying to avoid, and it is but justice to railroad mechanical engineers to say that the braking devices for trains used in this country are not as bad as the results of running trials Nos. 6 and 7 would indicate, and those roads that are now running long, air-braked trains do not find that trains break in two when the brakes are applied in regular service, the reason being that the brakes are practically uniform in action.

Just at this time air brake apparatus is receiving much attention from the Master Car Builders' Association, and those who are hesitating about what to do in this matter for freight trains and for high speed passenger trains will find a safe guide in the recommendations of that body, which will meet next month.

Reforming Railroad Accounts.

On another page appears an article by an auditor (and he is an old and able auditor) on railroad balance sheets. His main point is, that the assets of the railroads are seldom correctly stated in their reports, and he suggests that the probable answer to his complaint will be, "What are you going to do about it?" His own proposition is that the national and state railroad commissioners shall correct the matter. Perhaps they might do useful work in this way, but most folk will think that there will have to be a preliminary reform in the commissions themselves before any very valuable results will come from their efforts to reform railroad bookkeeping. We do not mean reform in morals, but a radical change in the calibre of the men making up the commissions. Honesty ought, of course, to characterize every feature of a balance sheet, or any other financial exhibit, but when we come to make up a statement of the real value of a railroad we must go beyond tabular statistics. Estimates for the future have to be made, and opinions become as important as facts. When we get thus far the character, experience and reputation of the man or men whose opinions are to be taken become vital factors in the case, and a survey of the commissions which now administer railroad affairs in the principal states of the Union does not inspire one with much hope that they will evolve any very valuable methods of railroad accounting. A score of state railroad commissioners met in Washington a few weeks ago. No one questions the honesty, uprightness and generally high characte of these gentlemen, and we suppose it is equally unquestioned that they are men of ability in their several spheres; but the most noticeable characteristic of this convention was the evidence it gave that the business of a railroad expert was not their sphere; that they had been charged with railroad responsibilities only a short time and had not become familiar with them; and that every one felt uncertain as to whether the tenure by which he holds his office promised that he would ever have a chance to make his mark as a railroad commissioner. Such a condition of things is worth the attention of any one who hopes to see the states improve the railroad service by compelling proper publicity of railroad finances. An investor who wishes to know what a railroad is worth and what rates it ought to charge, engages a man of experience to report upon it, and *nothing will take the place of this experience;* but a half million American citizens, in their capacity as a sovereign state, desiring to attain the same end, look chiefly at the *motives* of the man they would choose—we will not say that they nearly always look for a man who is "agin the railroads"—and place a premium on inexperience.

Professor Henry C. Adams spoke on this general subject—publicity of railroad affairs—at the Washington convention already referred to, and we printed his address in our issue of April 28, and his main idea, that full and accurate information concerning the actual condition of a railroad should be promptly reported to a public body and intelligently tabulated for comparison with other statistics, is undoubtedly sound. It is in the line with the plea of our correspondent to-day, and indicates one of the ways in which his idea must be carried out if it is to be carried out at all. But we must remember that the most meritorious plan for righting railroad wrongs is liable to break down of its own weight, for the magnitude of railroad interests is not appreciated by people generally. To place railroad affairs properly and promptly before the public in, say, a single state—New York or Iowa, for instance—would require an amount of work and a quality of ability which the lawmakers of these states have not even thought of.

Passengers who have to ride standing up generally entertain, for the time being, very hard feelings toward the company whose cars they are riding in, and their complaints of the hardship are often loud. The injustice of being made to pay for a seat and then stand up is every now and then the basis of a lawsuit. In some places, as, for instance, on the elevated railroad in New York City, it is a constant subject of grumbling. But we have just read of one instance of this kind, where the evil seems to be of long standing and where the roads might readily correct it, and yet where the passengers make no complaint whatever. This somewhat remarkable state of affairs is found in smoking cars on the late Saturday night suburban passenger trains out of Boston,

and is reported in a six-column article in the Boston *Herald* of last Monday. The explanation of this anomaly is found in the fact that most of the passengers who are so badly crowded are either dead drunk or so near that condition that they do not care whether they stand or or sit or lie down. It appears that, owing to a recent stiffening of the liquor laws in a number of large towns near Boston, the crowds who come to that city on Saturday to enjoy themselves for the evening and to carry home a quart or two of bottled enjoyment for the next day have largely increased; so much so that there had come to be general compliant on nearly all the railroads running from the city, and last Saturday night the *Herald* sent out reporters on the late trains of all the roads; and it reports a pretty loose state of affairs. As we have just intimated, the first fact noted was that the smoking car was packed full to the steps in nearly every case. On all the roads the trains begin to unload within three miles or less after starting, so that the overcrowding is not of long duration, but it appears that a decent man desiring to ride in the smoking car has no show whatever. On one train of 11 cars eight were monopolized by smokers; and the smoking was not their worst offense. The Western division of the Boston & Maine is first described, as being the worst of the lot. On the Eastern division of that road it was estimated that on Saturday afternoon and evening 8,000 passengers were taken out of Boston, and that 2,000 of these were more or less tipsy. It appears that since the recent complaints additional policemen have been assigned to the Boston stations, and at some of the stations many arrests were made. On the whole, the reporters give a favorable account of the police officers and the conductors. The cure of the evil will depend upon something more radical than any improvement that these men can make. The conductors are on the alert and promptly quell any attempts at fighting; but passengers who can be said, by any stretch of language, to be able to take care of themselves, are not disturbed as long as they do not become excessively boisterous. The policemen generally arrest everyone who is at all disorderly, especially at the Old Colony station, where the officers of the road have taken vigorous measures to protect respectable passengers. On one division of the Boston & Maine policemen were sent out with the trains.

The National League for Good Roads wants the railroads to carry its members to conventions at half rates and to carry its chief agitators free wherever they go, and has made formal application to the Trunk Line Association for these favors. As people are more and more coming to regard the railroads as one single interest, it is not to be wondered at that those who would use government money to "disseminate information" about how to make good roads should regard railroad treasuries, which are looked upon as one great inexhaustible treasury, as an especially suitable supply to draw from. Moreover, as the officers of the League are Governors and other prominent men, and as many railroads deem it always good policy to give passes to Governors, we are not sure that it would be directly unprofitable to grant the passes asked for; but we cannot see any real business reason for it. It is claimed that the materials for improved roads, which the railroads will have to haul, will produce a large income; but these materials are likely to be of a class on which rates have already been forced down to about cost, and the profit is very, very far in the future, we fear. A community of farmers who ought to tax themselves for a new road, but who have not the courage and foresight to do so, should be awakened in some way, but we fear that a convention of Governors and bicycle-makers would not have much effect in that direction. The convincing arguments must come from other farmers who have actually used good roads. Some railroads could, perhaps, afford to spend considerable money in producing such a farmer, or in producing a piece of road for all farmers to examine, but the League keeps its gloves on too much of the time.

Considerable dissatisfaction is expressed by manufacturers of engines, boilers, motors and other appliances for the generation or transmission of power, with the proposed methods of making awards at the World's Fair. It is generally understood that no tests of engines, motors or mechanical devices of any kind will be made. It is greatly to be regretted that those in charge ignore the fact that an unparalleled opportunity is at hand for carrying out a complete and exhaustive series of tests which would be of incalculable value to the engineering profession throughout the world. All types of boilers, engines, electrical appliances and machinery for the transmission of power are gathered within the Exposition grounds, ready to have their comparative merits passed upon. A committee appointed for the purpose by the American Society of Mechanical Engineers, at the request of the Committee on Awards of the World's Columbian Exposition, presented in December, 1892, a report on methods for physical and mechanical tests of engines and other machines and appliances. After dwelling upon the opportunity and the advantages offered for acquiring needed information, the committee submitted a classified schedule of tests for the various exhibits, together with suggestions as to how the work could best be arranged. Although submitted in due form and season, this report was ignored by the Committee on Awards. The present indications are that any merits possessed by the exhibits in the Departments of Machinery, Electricity and Transportation will not be disclosed at the Fair, but that the judges in making awards must be governed mostly by appearances and by the reputation of the exhibitors.

The Chicago & Erie began running trains by the block system throughout its line last Sunday, so that now the Erie's line is thus operated through from Jersey City to Chicago. This is the first line to claim that distinction. The New York Central has its block signals about ready for use as far west as Syracuse. They will be ready as far as Buffalo before long, and its chief connection, the Lake Shore, has the operating department so organized that trains can be blocked a station apart whenever bad weather or other conditions render it specially necessary; but we do not understand that all trains are regularly blocked. The Erie, indeed, uses the permissive system a good deal for freight trains, because on most of the lines the sections are too long for the use of the absolute system, especially on single track; and west of Salamanca, at least, its switches are not generally interlocked with the semaphores; but the fact remains that it has a block system, and its trains secure a great deal of protection from it that they did not and could not have under the time interval system.

Last Saturday another locomotive boiler explosion occurred on the Philadelphia & Reading, at Lebanon, Pa. Two persons were killed and five injured, three, it was thought, fatally. The alarming frequency of boiler explosions on the Reading has been noticed for a good while, and it would be a very interesting inquiry to find out why they occur so often. That they are more frequent than on any other railroad in the country appears to be a matter not of opinion but of fact. In the year 1892 at least six locomotive boiler explosions occurred on the lines of the Reading proper, while the whole number of explosions of locomotive boilers in the United States, as reported by *The Locomotive*, was 33, that is, the Reading had between one fifth and one-sixth of the total. On the other hand the Reading's locomotive equipment was about one-fiftieth of the total locomotive equipment of the United States, so it will be seen that the Reading's ratio was very far in excess of the average; in fact about nine times the average.

The city of Erie, Pa., was badly flooded by the overflow of Mill Creek on Tuesday last. The New York, Chicago & St. Louis and the Philadelphia & Erie were both inundated, and trains were delayed. Two large bridges on the former road were made impassable, and numerous culverts were washed out on both. On the following day, Wednesday, the flood extended all over northeastern Ohio and northwestern Pennsylvania, and a dozen lives were lost. There was great damage in Cleveland, and the Lake Shore & Michigan was badly damaged at many places between Erie and Buffalo. The reports indicate that many large culverts were washed out. Many hundred passengers were detained a day or two. The Pittsburgh, Shenango & Lake Erie lost a 300-ft. trestle near Girard.

The New York Central's Class N engine, No. 999, whose record of 102.8 miles an hour we published last week, broke that before the *Railroad Gazette* was off the press, and it is now claimed that the same runner, Mr. Hogan, hauling the same train, traversed a mile on May 11 in 32 seconds, equal to 112 5 miles an hour. We say "claimed," because the officers of the road will not yet say that they accept the record; but they probably accept it unofficially. The time was taken, as before, by the conductor of the train with a stop watch, and the grade was descending, 15 ft. per mile. It is said that engine 903, which has about the same size wheels as No. 999, but is of less boiler and firebox capacity, has made 97 miles an hour with the Empire State Express.

TRADE CATALOGUES.

Catalogue of the Standard Steel Works, 220 South Fourth street, Philadelphia, Pa.

One of the important features of this catalogue is the announcement of a change in the ingots from which the standard tires are made. Prior to the year 1892 the ingot used was a short one, and the entire ingot was used for each tire. It was from 12 in. to 15 in. high, and from 12 to 18 in. in diameter, and all of it except a small piece punched out of the centre went into the tire. Since the early part of 1892 all of the ingots used have been cast 5½ ft. long and 12 to 20 in. in diameter. From the top of the long ingot all piped and porous metal is cut off, and the remaining portion is cut into three lengths, each suitable for one tire. These billets therefore contain none of the honeycombed metal which was formerly found in the short ingot and worked into the tire. Etchings are shown of two tires, one made from the old short ingot, and another from a billet cut from the long ingot, showing a great improvement in the homogeneity of the new tire.

This catalogue also mentions the fact that the works have put in all the tools necessary for the manufacture in large numbers of the Vauclain wrought iron wheel centre. The illustrations show various parts of the shops and also wheels made and being made. The company uses either the Gibson tire fastener, the Mansell retaining ring or the double-lip retaining ring, as may be desired.

The Park Avenue Improvement, New York.

Preliminary work has begun on the iron and steel viaduct by which the New York Central tracks are to be carried above the streets so as to cross the Harlem River at 135th street, New York, 24 ft. above the water, and contracts for that portion south of the river will probably be awarded this week by the Board of Commissioners appointed under the law of last year to carry out the improvement. This board was appointed by the Mayor of New York and consists of five members. Charles W. Dayton, a lawyer, is President of it, and Walter Katté, Chief Engineer of the railroad, is a member. Mr. Katté has direct charge of the work as "Superintending Engineer" of the Board. The contracts require that work be begun by Sept. 1 and completed by March 1, 1894.

The bids received by the Board were as follows, only three companies bidding:

	Section 1.	Section 2.	Section 3.	Section 4.
Elmira Bridge Co.....	$373,000	$344.000	$379,000	$424,000
King Bridge Co.....	464,756	397,546	424,449	510.426
New Jersey Steel & Iron Co.....	357,000	311,300	333,000	.....

The principal part of this work south of the river begins about three and one-half miles north of the Forty-second street entrance of the Grand Central Station, and is the construction of an elevated four-track railroad in the centre of Park avenue on the same location where now the railroad (four-track) is in a walled cut about 20 ft. deep. From the details printed below it will be seen that this cut is about three-fourths of a mile long. The new structure will be built above the cut and then the latter will be filled up. At present the transverse streets, 260 ft. apart, cross the cut on iron girder bridges. South of the cut the new metal structure will stand upon the present masonry viaduct. The arched openings in this viaduct, for the transverse streets, will remain as at present. One street, 114th, which is now closed because it is on a level with the railroad, will pass under the new elevated structure.

The entire length of this will be 6,279 ft., and the work has been divided into four sections. Section 1 is the most southerly. It begins at the present level of the tracks at 110th street, and the tracks will rise at 40 ft. per mile for about 1,400 ft. to 115th street, the highest point, and thence northward by level or slightly descending grades to the river.

Section 1 is 1,873 ft. long and ends at 117th street. Section 2 is 1,570 ft. long and extends from 117th to 123d street. Section 3 is 1,083 ft. long and extends from 123d to 127th street. Section 4 is 1,883 ft. long and extends from 127th street to the river (134th street). From 130th street northward to the river, the transverse streets are on a level with the present tracks, but will be opened through when the railroad is elevated.

The new structure will be a metal viaduct resting on three rows of columns, and the floor will be generally about 25 ft. above the street, the minimum head room for wagons being 14 ft. The two outer rows of columns will stand on the line of the present brick walls, and the foundations for them are now being made. These foundations will be put down to the level of the present track where necessary, and will be of brick up to the level of the street. The middle row of columns cannot be put up until the present tracks shall have been removed, and the new structure will be temporarily supported in the middle by wooden transverse trusses resting on the side walls of the cut. Trains on the present tracks can pass under these trusses. Similar trusses will be used for the false work, where necessary, so that the new structure can be built without disturbing trains.

The cut extends from 115th street to 130th. From 110th to 115th, where the present tracks are on a masonry viaduct, the transverse streets are already provided for by under-bridges, and the new structure will rest on shorter columns, the southernmost being only 3 ft. high. To permit the construction of this portion, temporary timber trestles will be built in Park avenue from 106th to 115th street, adjoining the masonry viaduct, to carry the tracks, two on the east side and two on the west.

The longitudinal steel plate girders of the viaduct will consist mostly of spans 65.44 ft. long (four of these to each city block) and the girders will be 7 ft. deep. The solid continuous floor rests on top of the girders for most of the way, but in a few spans where space has to be economized for head room underneath it is supported by brackets fixed to the sides of the girders about 3 ft. from their lower edges. The bracing consists of a transverse riveted lattice about 3 ft. deep at the end of each span.

North of the river the present line is not in the street. It crosses two streets at grade, and the new elevated road will be an earth embankment with masonry retaining walls most of the way, except where it crosses these streets. It will be practically a level from the river to 138th street (Mott Haven Station), and thence descend to the present level at 149th street. Temporary tracks, west of the present line, are being built for use during the construction of this part of the improvement. The large brick station at 138th street, built in 1887, will have to be moved back, as there are at present at that point only two main tracks, while the new line will have four. Work on this station has already been begun.

The contract for the drawbridge has been awarded, as heretofore announced, to the King Bridge Co.

The temporary bridge, with lift draw, will probably

be finished in about two weeks. As soon as this is put in use, with the temporary tracks north of the river, work will be begun on the elevated road on that side of the river.

TECHNICAL.

Manufacturing and Business.

Friedrich Rosenberg has resigned his position as General Manager of the Bessemer Ditch Company and Engineer of the Colorado Coal & Iron Co., of Pueblo, Colo., to take an interest in the firm of Jutte & Foley, contractors, of Pittsburgh, Pa.

The Barney & Smith Car Co. has declared a quarterly dividend of 2 per cent. on the preferred stock and a dividend of 5 per cent. on the common stock.

Application has been made to the Ontario Government by J. A. Facer, Edward Ramsden, Oliver White, of Philadelphia, Pa.; Samuel Wilson, John Hart and Robert Drummond, of Perth, Ont., for a charter for the Facer Hammered Solid Steel Car & Locomotive Wheel Co. (Ltd.), with headquarters at Hamilton, Ont.

Roger Morgan, who has been connected with the Altoona shops of the Pennsylvania for 20 years, is in charge of the exhibit of the Columbia Metallic Packing Co., of Chicago, at the World's Fair.

The Silberhorn Refrigerator Car Company has been incorporated in Illinois, with a capital stock of $100,000. The incorporators are William H. Silberhorn, John J. Silberhorn and Frank O. Weeks.

The town of Reading, O., is constructing a waterworks, and the contract for pumps, boilers, etc., has been awarded to the Laidlaw-Dunn-Gordon Co., Cincinnati, O.

The Automatic Electric Railway Signal Co., of New York City, was incorporated in Albany, N. Y., last week. The Directors are Charles A. Senior, Jr., of New York; William R. Robins, of Ozone Park, and Charles S. Langhurst, of Brooklyn.

The Page woven wire fence has been in experimental use on many railroad lines for two or three years, and experience with it is so satisfactory that it is now being purchased in carload lots by a number of important railroads, among which are the Vandalia, West Shore, Michigan Central and Lake Erie & Detroit River. The last named, a Canadian road, has nearly 100 miles in use. A number of new roads now under construction are purchasing this fence for use along the entire line. The advantages of the fence are its durability and the excellent manner in which it turns stock without injuring it, as barbed wire frequently does. Small stock like pigs and lambs cannot get through it, and it gives the best of satisfaction to the farmers. The Michigan Central has had the fence in use for about three and one-half years. We are informed that Mr. Dailey, of Detroit, who is in charge of bridge and fence construction on this road, reports examining a four-mile stretch of Page fence put up last fall, and finding but a single wire broken on the whole line, this occurring where a splice had been made.

Iron and Steel.

The Lima Steel Casting Co., of Lima, O., at its annual meeting, elected the following directors: James Langan, George W. Disman, W. T. Agerter, T. T. Mitchell, J. W. Maxwell, William Roberts, H. D. Campbell, T. K. Jacobs and C. M. Hughes, Jr.

The Ætna Standard Iron & Steel Company is the name under which the Ætna Iron & Steel Co. and the Standard Iron Co., both of Bridgeport, O., have been consolidated. The officers of those two companies become officers in the new company. W. T. Graham and J. J. Holloway, of the Standard Iron Company, are respectively President and Treasurer of the new company; B. M. Caldwell and J. A. Topping, of the Ætna company, are respectively General Manager and Secretary.

Spring Rail Frog.

The Vaughan spring rail frog was illustrated in the *Railroad Gazette*, Oct. 7, 1892, and at that time we spoke of its having been satisfactorily used on the Pennsylvania. A recent letter from one of the Engineers of Maintenance of Way of that road says, "We are using them pretty largely, and our supervisors are very much pleased with them." They are now made by the Wharton Railroad Switch Company, Philadelphia; the Johnston Railroad Frog & Switch Company, Chester; the Union Switch & Signal Company, Swissvale; the Pennsylvania Steel Company, Steelton, all in Pennsylvania; the Ramapo Iron Works, Hillburn, N. Y., the Paige Iron Works, Ajax Forge Company and the Morgan Frog & Crossing Company, Chicago, Ill.

Interlocking.

The St. Paul & Duluth expects to protect with interlocking signals the crossing of the Wisconsin Central at Gladstone and that of the Minneapolis, St. Paul & Sault Ste. Marie at Bald Eagle Junction. The interlocking plant at West End Junction, Duluth, has just been completed and is now in operation.

Electric Launches at the World's Fair.

Fifty electric launches, each 35 ft. long, 6 ft. 6 in. beam, and drawing, when loaded, about 26 in., are in service in the lagoons. A four horse-power motor directly connected to the propeller shaft drives an 18-in. screw, the regulating switch and wheel being placed forward, while the necessary current is supplied from 78 storage cells placed beneath the seats. Thirty passengers can ride comfortably in each launch. The launches are strongly constructed of oak, with a double planking of cedar and an interior finish of mahogany, with hair-stuffed leather cushions and ample awnings.

The Biggest Transatlantic Liner?

Dispatches from London say that the White Star Company has placed an order with Harland & Wolff, of Belfast, for a ship to be 800 ft. long. The New York office of the company is, however, quite ignorant of this order, which may or may not mean that the dispatch is one of those "fakes" which the cable news companies seem to delight in. It is expected that the "Gothic," building by the same firm for the White Star Line, will be launched about the end of June. She is about 500 ft. long and is a freight steamer for the Pacific service.

Caisson Foundations for a Big Building.

Since April 9, when the first caisson for the foundations was delivered upon the site of the new Manhattan Life Insurance Building, at 62 Broadway, New York, there have been sunk, filled and sealed three caissons, and the piers upon them have been completed. Three other caissons have been sunk so far that they will be sealed and the piers completed within a week. By exercising great care, and by using plenty of pig iron for weighing when necessary, the contractors have thus far been able to sink these caissons close to adjoining buildings without disturbing the ground 6 in. distant on any side. This is a point about which there was some discussion before the work was begun, inasmuch as it had never before been attempted to sink caisson foundations to a depth of 54 ft. close to an adjoining large building; but the contracting engineers, Messrs. Sooysmith & Co., have so far been successful. A description of the plans for this work appeared in the *Railroad Gazette* some weeks ago.

Docks of the Northwestern Coal Railway Company at West Superior, Wis.

This company owns 75 acres of dock property on Allouez Bay, Superior. It is the company's intention to construct a mammoth dock covering the entire property and equipped with the most improved appliances for the rapid handling of coal. The front line of the property, which is 3,300 ft. long and 950 ft. wide, touches the main channel of the bay and is almost directly opposite the natural entrance to Superior harbor. Slips will be dredged on either side 150 ft. wide and 19 ft. deep. This year the first section of the dock, about one-fifth of the entire plant, will be built. It will be 475 ft. wide and 1,500 ft. deep. The officers of the company are now considering plans contemplating the use of electricity for the machinery for unloading vessels. It is the aim to unload vessels as rapidly as possible and the company hopes to be able to construct a plant that will be capable of such rapid work that a vessel of 2,000 or 2,500 tons may be able to discharge its cargo of coal within twelve hours. This will not only insure the minimum loss of time of vessels at dock, but will also be of advantage to the railroads.

At the present time the coal docks at the head of Lake Superior are mixed in with elevators, mills and merchandise docks. Consequently there is great delay in the placing of cars for loading with coal, and in the subsequent handling of them when loaded. This company will also construct about 12 miles of track connecting the dock directly with the several railroads.

The contract for the entire work, including construction of the dock, dredging slips and building the trackage, has been let to Messrs. McMullen & Morris, of St. Paul. C. J. A. Morris, of St. Paul, General Manager and Chief Engineer of the company, has charge of constructing and equipping the plant.

The Northern Line Steamers.

The current number of the *Marine Review* has a colored lithograph of one of Mr. Hill's passenger steamers now building by the Globe Iron Works Company, of Cleveland, and a letter from Miers Coryell, the designer, on the Belleville boilers, which are to afford over 7,000 H. P. for driving the ship. The first boat is now nearly plated and is to be launched about Aug. 1, and is to have the boilers and machinery in about Oct. 1. Excepting the mahogany and primavera everything used in construction is to be of American origin. The plating and machinery are from the Cleveland Rolling Mill and the Cleveland City Forge, the beams from the Pencoyd Iron Works, the malleable castings from Bridgeport, and the tubes from the Syracuse Tube Company. It is claimed that in the matter of power these vessels will represent a higher practice than will be attempted in the American line ships just begun by the Cramps. Comparing the electric lighting with that of the new Cunarder, the "Hill" ship, with a length of 380 ft., will have 1,200 lamps, while the "Campania," with a length of 620 ft., has 1,360 lights. This plant, to be installed by the Fisher Electric Company, of Detroit, will consist of three sets of direct connected triple expansion engines and dynamos, each furnishing 400 sixteen-candle-power lights. Mr. Coryell's letter says that the vessels will each have 28 Belleville boilers tested for 300 lbs. of steam, to give a working pressure of 250 lbs. for the quadruple expansion engines, these boilers with his arranged in three groups, two of 10 and one of 8, joining directly over the keel with the coal bunkers outside of the firerooms. Mr. Coryell does not consider the use of these boilers in the light of an experiment, simply because they have not been used for large power in this country, and cites their use in French steamers.

Examination of Firemen for Promotion.

The committee of the Traveling Engineers' Association on examination of firemen for promotion and of new men for employment, Messrs. J. D. Vantwood, N. M. Maine and W. A. Murdock, have sent out a circular requesting members to answer the following questions for the information of the committee:

1. Do you examine your firemen on machinery and ability to handle same before promoting them to engineers? 2. Do you use any progressive form of examination? 3. Do you examine them on various kinds of "break downs," and how to get an engine to the shop? 4. Have you any educational test, except ability to read and write English fairly? 5. Do you examine engineers hired from other roads; if so do you do it as thoroughly as when examining firemen for promotion, or more so? 6. Do yon have any set form of questions, or do you ask questions as you see fit? 7. Do you examine applicants for positions as firemen; if so, what does it consist of? 8. Do you examine on air brake practice; and how is it done? 9. Do you examine them on colors and vision? 10. Who examines them on time card and rules? 11. Do you have any age limits for new men—youngest and oldest? 12. How are the examinations conducted? Are answers written or verbal? 13. In promoting men, do you consider ability paramount to seniority? 14. How do you determine the comparative standing of men examined? 15. Is the examination conducted by a board, or by yourself only? 16. Do you consider the ability of men to economize in the use of supplies when promoting firemen? 17. Are engineers for whom firemen have fired consulted regarding candidate's ability? If so, has their opinion any weight in the matter? 18. Do you issue any form of certificate to candidate passing a mechanical examination? 19. If a man does not pass his first examination, do you give him one or more [additional] trials?

Any other information bearing on the subject will be gladly received. Mr. Vantwood's address is South Kaukauna, Wis. The Secretary of the Association is W. O. Thompson, Elkhart, Ind.

Electric Power Circuits at the World's Fair.

In addition to the numerous circuits transmitting current for arc and incandescent lighting, there is also an independent set of eight circuits designed for electric power service only. These circuits extend either directly or by means of tap-wires into all the principal buildings and have a total length of 95,000 ft., insulated with ⅛-inch wall of rubber, over-braided. These circuits are numbered respectively from 1 to 8. Circuit No. 1 supplies the necessary current for operating the motors in the Transportation Building and the annex thereto, and consists of 10 0000 cables that pass down from the C. & C. generators into the subway, and from the northwest corner of the annex to Machinery Hall are carried to the elevated structure to the west centre of the Transportation Building, where a distribution of current, aggregating 200 H. P. for the Transportation Building and an equal amount for the annex, is arranged for making a total of 400 H. P. Current may also be taken from these circuits, not only for motive service, but also for so-called "incandescent arc lamps," operated in series of 10 on these 500-volt circuits, to illuminate the interior of the annex to Transportation Building. Circuit No. 2, consisting of four 0000 cables, passes through the subway to the centre of the Government Building, where two of the cables are carried into the building to operate motors, 50-H. P. capacity of which are already placed, and the remaining two cables extended to the Fisheries Building to supply the current required by C. & C. motors that operate the circulating pumps connected to the tanks. Here the circuit is reduced to two 0 wires and carried up through tubing and attached to insulators supported on a series of special cross arms fastened beneath the roadbed of the elevated railroad structure, and thence passes around the north end of the park and as far south as the west centre of the Woman's Building From the Woman's Building a circuit of two 0000 wires extends south and east to the power plant, the two 0 wires being the connecting loop for the two arms of this circuit that has a total length of 28,930 ft. At the station of the Weather Bureau this circuit is tapped for current to operate a 5-H. P. motor; at the New York State Building for a 25-H. P. C. & C. motor; at the Woman's Building for two 20-H. P. motors for elevator service; at the northwest corner of the Horticultural Building for a present aggregate capacity of 50 H. P; and at the Service Building for current to operate ventilating fan motors of 3 H. P. and 5 H. P. capacity. From the northwest corner of Machinery Hall, power circuit No. 3, consisting of four 0000 wires, passes to the elevated structure and is carried around to the east centre of Midway Plaisance. Here it is divided into two circuits each of two 0000 wires and carried in the Plaisance on poles. This circuit extends through the Plaisance and is tapped at frequent intervals to supply current to operate motors. The capacity of this circuit exceeds 200 H. P. Circuit No. 4, consisting of six 0000 cables, leaves Machinery Hall at the southeast corner, and through ducts extends to and along the elevated structure to the east centre of the Dairy Building, where a 17½ H. P. motor is utilized in driving a refrigerating machine and a 30 H. P. motor belted to line shafting. At the southwest corner of Agricultural Annex a tap line conveys current to six motors, one of 70, two of 60, and three of 30 H. P. each, that are driving line shafting. Circuit No. 5, consisting of six 0000 cables, leaves Machinery Hall at the southeast corner and is supported beneath the elevated structure to a point near the southwest corner of the Agricultural Annex, then down through tubing and underneath the docking to the middle of the Casino pier, where it supplies the feeder wires with 300 H. P. in current to the motors that operate the Movable Sidewalk. Circuit N. 6, four 000 wires, conveys current to the Manufactures Building, where an aggregate capacity of 150 H. P. in motors will be in service. Circuit No. 7 supplies 400 H. P. in current to the Mines and Mining Building, with the aid of six 0000 cables, operating two 150-H. P. motors belted to line shafting, and one 6 H. P. and one 17½-H. P. motor connected to pumps, while additional motors are being attached. Circuit No. 8 passes down from the C. & C. bus bars to the subway, and thence in ducts to the southeast pavilion of the Administration Building, and conveys 200 H. P. in current that is utilized operating the eight 25-H. P. Eikemeyer elevator motors and the 42-inch ventilating fans, each of which are driven by a 2-H. P. motor.—*World's Fair Electrical Engineering.*

THE SCRAP HEAP.

Notes.

It is reported that about 100 men left the New York Central shops at Depew, May 11, on account of unsatisfactory wages.

A local freight conductor on the Ohio & Mississippi was fatally wounded last Saturday by a passenger who refused to pay his fare and attacked the conductor with a pistol.

An express car on a train of the Mobile & Ohio was robbed of $1,000 near Laketown, Ky., on the night of May 11, dynamite being used to blow a hole in the side of the car.

The Florida Legislature has been discussing a bill to re-establish the State Railroad Commission (which was abolished by the last legislature), but the Senate finally rejected it by a vote of 16 to 10.

Governor Flower, of New York, has vetoed the bill passed by the last legislature, the purpose of which was to extend the alleged benefits of the 10-hour labor law. The Governor's chief objection to the bill is that the employés of the elevated and the surface street railroads in New York City were excepted from its provisions.

The legislative committee which has been investigating the New York, New Haven & Hartford road at Boston has decided to report that the charges against the company are unfounded.

The Illinois Central is to build a grain elevator at New Orleans to accommodate local trade. The "Terminal Warehouse Company" has been organized at Baltimore to build storehouses for flour and merchandise. The buildings will be located by the Northern Central (Pennsylvania) tracks and the company is formed in the interest of the Pennsylvania.

At Knox, Ind., 21 suits have been filed against the Indiana, Illinois & Iowa road for failure to post bulletins at stations regarding the probable arrival of passenger trains, as required by law. At Columbus, Ind., a suit has been brought against the Pittsburgh, Cincinnati, Chicago & St. Louis for showing a train on the station bulletin as 15 minutes late when in reality it was 35 minutes late.

Rivet heads made of clay and painted over so as to represent perfect rivets are cited by a German contemporary as makeshifts known to have been adopted by German dealers in second-hand steam boilers with the view of selling them to unsuspecting customers. Tricks of this kind are so generally credited to "Yankee" ingenuity that their occurrence in a staid, Old-World country is rather a refreshing novelty.

It comes out that the alleged new freight tariff of the Southern Pacific, which a San Francisco paper recently printed, was procured from a discharged clerk who had taken the tariff, or the data for compiling it, when he left the company's employ several months ago. The company had discharged 14 clerks on account of the disclosure of these rates, and it is now stated that these clerks are restored to their places. Whether the rates published, and which were considerably lower than those of the tariff now in force, are really to be used, does not appear.

World's Fair Notes.

The A. French Spring Co. has a large exhibit of springs in the Transportation Building. It comprises driving springs of all sizes; double, triple and quadruple elliptic, coil springs with one or more concentric coils, or arranged in pairs and held with plates.

Adjacent to the A. French Co. exhibit is that of the Standard Steel Works, of Philadelphia. In this exhibit are plain and flanged finished tires of all sizes; ingots, like those from which the tires were rolled; and unfinished tires showing the tire in the various stages of rolling. There are also wrought iron wheels, some of which of various sizes are finished, and others unfinished showing the process of forging, some show the wheel just after the finishing blow has been struck; others show the hub, spokes and rim just run together in the heating and ready for the finishing die. This will be a very interesting and instructive exhibit to many visitors.

The Ensign Manufacturing Company, of Huntington, W. Va., and the Canda Manufacturing Co., of Carteret, N. J., have an exhibit of cast iron car wheels of different kinds, varying in size from 20 in. to 36 in. in diameter. There are hollow-spoked wheels for engine trucks and spoked wheels for street cars, as well as the ordinary car wheels. One wheel has been broken in halves, one-half being left as broken to show the fracture and chill, and the other is planed to show other characteristics of the metal. These wheels were all cast in the sectional chill designed and patented by F. E. Canda. This chill was illustrated in the *Railroad Gazette*, March 25, 1893.

The Marion Steam Shovel Company has a steam shovel and a dredging machine of the Barnhart patent set up in the Transportation Building, and each is operated by compressed air supplied from the compressors in Machinery Hall. The Baldwin locomotives at the Fair are raised from the rails and will be operated by similar means. It is expected that when all these get to working, the visitors to this building will have the pleasure of witnessing a snowstorm even on the warmest days. The air expanding to atmospheric pressure at the exhaust tip will absorb heat from the walls of the exhaust pipe, causing moisture to be deposited on the outside and inside of the pipe; this will freeze, and the particles of ice will increase in size till they present surface enough to the blast to be broken off and carried out of the stack. Such has already been the experience with the Barnhart steam shovel; and the exhaust from the air pumps in the various air brake exhibits is giving trouble in the same way; the pumps are worked by air instead of by steam, and after running five or ten minutes the exhaust pipes become completely stopped with ice and a thick coating forms on the outside of the pipe.

Lake Notes.

The first vessel to leave Duluth this season was the "James Fisk, Jr." She left on the 7th, but was two days getting through the ice. The "Fisk" arrived at Buffalo on the 14th. On the 9th six steamers entered the harbor of Duluth and relieved the coal famine there.

Mr. Conway C. Wyatt, a civil engineer from Duluth, was at Ottawa on the 11th inst. asking for a charter for a canal 12 miles long, from Lake St. Clair to Lake Erie. This will cut off Detroit and 110 miles of distance. No mention of its probable cost is made, though it is asserted that all preliminary surveys are completed, but Mr. Wyatt says he will give a guarantee that the work will be completed within two years, and will agree that the tolls shall not exceed two cents a ton. From this time limit it would appear that no lock is contemplated.

The Pennsylvania's Exhibit at the World's Fair.

The most prominent feature of the exhibit of the Pennsylvania Railroad System at the World's Fair is a model way station, the building being located near the Transportation Building and being filled with a large collection of models, maps, charts and historical data of various kinds.

This building, built in the same manner as the other buildings at the World's Fair and covered with staff, is one story in height with a clere-story. It is of handsome design, with an imposing entrance and a bay window at each end. It is 140 ft. long and about 30 ft. wide. On the side toward the tracks there is the usual roof over the platform. There are four tracks, showing the standard Pennsylvania road way with fences separating the two inner from the two outer tracks. There is an ornamental overhead bridge for passengers to cross the tracks, and on the platform opposite the station is a signal tower. On the track stands the old locomotive "John Bull" and its train, and near by are specimens of the Camden & Amboy rail of 1831, of the rail used on the portage railroad over the Alleghenies, and of the strap rail originally used on the Madison & Indianapolis.

The heavy cars used to transport the Krupp guns from Baltimore to Chicago are exhibited here, together with models of United States 16-in. and 10-in. guns to show the manner in which these cars carry their loads.

In the main room of the building there are numerous mahogany showcases containing a great variety of relics. On a platform in the centre of the building are three relief maps showing the old portage railroad and parts of the present line of the Pennsylvania through the Alleghenies. One of the most attractive models is a reproduction of one of the double-deck ferryboats running between New York and Jersey City. On one wall of the room there is a map 33 ft. long showing the position of each train in motion on the Pennsylvania system at 6 a. m. Oct. 21, 1892. There will be a bureau of information in the building.

The modern cars of the Pennsylvania will be shown in their proper place in the Transportation Building. There will be a standard passenger car, a refrigerator car and a track inspection car.

The British Shipping Business.

The depression in shipping property, which was so marked at the date of issue of our last circular, October 30, 1892, still continues, and at the annual and semi-annual meetings of the shareholders in steamship companies are, as a rule, of the most depressing character, while the shrinkage of dividends must have been acutely felt by many whose income mainly depends on them. We regret we cannot see any rift in the clouds, and we fear any permanent improvement cannot be looked for this year. What 1894 will be must be determined by those most interested, who have the power in their own hands, by not increasing the tonnage, and only building such vessels as they may require for their legitimate business. The advice that we tendered in our last issue—viz., to accept breaking-up prices for a quarter of million tons of obsolete tonnage—was severely handled by some writers and jeered at by others; but its correctness has been tested by the removal of 80,000 to 100,000 tons from the active list, and we believe many other vessels of this class will shortly follow suit. We again repeat this advice, and hope it may be followed. Singular to say, rather an active demand has set in for good second-hand vessels of 2,000 to 3,000 tons dead weight, and about 60,000 tons register have lately changed hands, but at prices that must have nearly broken the hearts of the original investors. There is no doubt that in certain trades good second-hand vessels of low value can still earn a moderate living. This continued and severe depression has at last exhausted the patience of several single ship companies, and has necessitated the collapse of several weak firms, causing the forced sale of a good deal of useful tonnage, and the removal from the list of shipowners of some who added but little to the strength of the confraternity. The lesson has been an expensive one, but may yield good results. Freights are abnormally unremunerative, and we fear will remain so while tonnage is so much in excess of trade requirements.—*Moss & Co.'s Circular.*

The Celebration of the Opening of the Great Northern to the Pacific.

The committees having in charge the arrangements for the "Hill Celebration" at St. Paul are making excellent progress. Large forces of men are at work erecting arches and the immense platform in Smith Park. The people of Minneapolis are joining heartily with the St. Paul citizens, and will contribute several handsome floats in the industrial parade. Other cities to be represented are St. Cloud and Duluth, Minn.; Grand Forks, N. D., and Spokane, Seattle, Tacoma, and Everett, Wash. All these cities will send delegations of representative men, as well as providing floats for the parade. The original intention was to have had celebrations in the various cities along the route of the Great Northern, but it was decided to combine in one grand demonstration at St. Paul. The ceremonies will begin on Wednesday, June 7, with the great parade; on Thursday there will be a general reception and entertainment, and on Friday the celebration will close with a banquet. Many prominent railroad and public men have been invited to participate in the ceremonies which are intended to mark an epoch in the development of the railroad systems of the Northwest.

A High Novelty at the Fair.

A model of a new design for cars and locomotives for elevated rapid transit service attracts considerable attention in the extreme west end of the annex to the Transportation Building. It is the exhibit of the H. B. & L. Elevated and Electric system, G. M. Ludlow, Secretary. The entire train consists of one car and two motors, carried on two pairs of driving wheels 15 ft. in diameter. The motors are on the driving axle. Both ends of the train are identical, each being provided with a cab from which a long snow-plow point extends forward and downward to the rail; the roof of this is of sheet-iron plates hinged horizontally and connected in such a manner with a lever in the cab that the driver can turn them to a vertical position to increase the surface exposed to atmospheric resistance, and assist in making stops. In these pointed ends the baggage is to be stored. The car, which is 75 or 80 ft. long, is pivoted vertically to each motor, allowing free movement around curves. As one pair of wheels alone will not ride satisfactorily on the rails, there is a pair of guiding wheels placed front and back of each pair of drivers; these roll on the under side of the flange of the structure at an angle of about 30 deg. below the horizontal. The exhibitor claims that these supplemental wheels are to prevent the train raising off the rails at speeds of 100 miles an hour at which it is designed to run. The model represents a train 150 ft. long, the estimated weight of which is about 40 tons.

Ore on Lake Erie Docks.

The annual report of the *Iron Trade Review*, Cleveland, gives the following summary of iron ore on the docks at Lake Erie ports at the opening of navigation for 1884 and succeeding years:

Year.	Gross tons.	Year.	Gross tons.
1884	388,739	1889	558,753
1885	556,657	1890	936,228
1886	373,321	1891	2,662,223
1887	149,304	1892	1,537,188
1888	703,720	1893	2,095,797

The account, with each port, is given as below:

Ports.	Close of Navigation.			Opening of Navigation.		
	Dec. 1, 1890.	Dec. 1, 1891.	Dec. 1, 1892.	May 1, 1891.	May 1, 1892.	May 1, 1893.
Toledo	110,710	122,515	71,409	27,000	62,960	11,863
Sandusky	115,000	122,000	87,500	70,000	85,500	74,875
Huron	1,200	14,910	45,000	1,200	5,000	40,000
Lorain	210,237	230,812	147,600	158,749	115,919	99,300
Cleveland	1,209,467	1,114,762	1,347,992	908,566	452,664	628,639
Fairport	721,000	597,617	610,609	465,612	255,422	287,727
Ashtabula	1,151,317	903,957	1,312,6 8	789,433	361,806	712,355
Erie	248,714	252,916	401,683	199,663	131,437	173,569
Buffalo	125,732	129,000	125,000	42,000	66,480	67,469
Total	3,893,487	3,508,489	4,149,451	2,662,223	1,537,188	2,095,797

The *Review* says that as the excess of this year's stock is 558,609 gross tons over that of a year ago, the Lake Superior ore sent to furnace yards amounted to 8,515,634 tons, "the largest record in the history of the region." This is on the assumption that all the ores not reaching Lake Erie ports went direct to the furnaces of Illinois, Michigan, Wisconsin and Minnesota, and may therefore be regarded as consumed. The shipments to furnaces from lower lake ports are given as below:

Year ending:	Gross tons.	Year ending:	Gross tons.
May 1, 1893	6,102,125	May 1, 1890	4,936,637
May 1, 1892	5,502,496	May 1, 1889	3,928,626
May 1, 1891	5,148,669		

Our Pig Iron Production.

The furnace capacity, as returned by the *American Manufacturer*, on the first of this month was 186,982 tons. There has been a nearly continuous increase in capacity since September of last year, when the capacity swung down from the maximum for this or any other country, of 193,827 tons in March of last year to 156,194 in September. The approximate makes for the first thirds of the last four years have been as below, with the production by years:

Year.	Approximate make of first four months.	Total production for year.
1890	3,068,000	9,202,703
1891	2,201,000	8,279,870
1892	3,280,000	9,157,000
1893	3,057,000	.....

The circumstances are unusual: while the furnace capacity and production has been increasing, the stock on hand has been decreasing, purchases are made of smaller quantities and prices are shaded almost week by week. This seems to be an anomalous instance of production and consumption increasing concurrently with loss of commercial confidence in the future; a production which seems to be developed by steadily lowering prices. These lower prices have been made on iron produced from ore contracted last spring, and without aid from the lower contracts of this spring. This year's contracts, nearly 20 per cent. lower than last year's, seem to show a general acceptance of lower prices by the trade. Contract prices for 1888 and subsequent years for Lake Superior ores delivered at Lake Erie ports are given in the *Marquette Mining Journal* as below:

Grades.	1888.	1889.	1890.	1891.	1892.	1893.
Republic & Champ., No. 1	$5.75	$3.50	$6.50	$5.50	$5.50	$4.50
Cleveland & L. S., specular						
No. 1 non-B	5.25	5.00	6.00	5.00	5.00	4.00
Chapin	4.75	4.50	5.50	4.25	4 55	3.65
Soft hematites, No. 1 non-B	4.00	3.75	4.50	3.75	3.75	3.25
Gogebic, Mar. & Men., No. 1 B. hem	4 75	5.00	6.00	4.75	4.50	4.00
Minnesota, No. 1 Bess	5.75	5.50	6.50	5.50	5.65	....
Minnesota, No. 1 non-B	....	....	....	....	4.85	....
Chan., No. 1 Bessemer	....	....	....	....	4.85	....
L. S. & Lake Ang., ex low-phos. Bessemer	....	....	....	....	6.00	4.65

The above prices are those which were made in the spring. They have been often shaded in later sales, notably in 1890, when sales made later were about 50 cents lower on the average. A part of this year's reduction has been assumed by the lake freighters in season contracts, but there are hopes among the vesselmen that "wild freights" this year will be much higher, on the average, than contract freights.

A Fall of 3,000 Feet.

Last Sunday noon an extraordinary accident happened in the Red Jacket shaft of the Calumet & Hecla copper mine at Houghton, Mich. A cage containing 10 men fell 3,000 ft. The men were coming up for dinner and the cage was hoisted too high, striking the top of the frame, breaking the cable or some of the attachments. It is said the cause was a defective indicator in the engine room. The index had slipped and the man in charge supposed that he had several hundred feet further to hoist. A coroner's inquest was held and the precise facts will probably be developed.

LOCOMOTIVE BUILDING.

The Manhattan Elevated road is receiving bids for building 20 locomotives.

CAR BUILDING.

The Beach Creek road is in the market for 500 coal cars.

The Manhattan Elevated order was awarded this week to the Wason Mfg Co., of Springfield, Mass. The contract is for 75 cars.

BRIDGE BUILDING.

Carlisle, Pa.—A new bridge—either iron or wood—326 ft. long will shortly be built across the Conodoguinet River, at Sporting Hill.

Elkton, Md.—The Youngstown Bridge Co. has just completed a county highway bridge across the Bohemia River near this town. The contract price for the bridge was $14,965. The structure was to have been completed on Dec. 24 last, and the company is subject to a forfeit of over $6,000.

Everson, Wash.—The west 150 ft. of the new steel bridge under construction by the San Francisco Bridge Co. across the Nooksack River, at Everson, near Whatcom, also the falsework, were carried away by high water last week. The loss to the company will be about $2,000.

Harmonsburg, Pa.—A 34-ft. iron bridge will shortly be erected over the inlet, just east of this place, the contract having been let.

Minneapolis, Minn.—The West Minneapolis bridge over which there has been so much controversy has at last been contracted for. This is the West Lake street bridge across the right of way of the Hastings & Dakota and the Minneapolis & St. Louis railroads. Last fall the contract for this structure was awarded to D. D. Smith, on his bid of $22.87 per M. In his bid, however, he specified that he should be allowed 90 days in which to complete the work. T. L. Rosser, Jr., whose bid was $23.30 per M., obtained an injunction restraining the city from entering into the contract with Smith. This spring bids were readvertised for, and the lowest bidder was J. McCallum at $20.47½ per M. He has already begun the work. The bridge including approaches, is 1,055 ft. long, contains 397,000 ft. of lumber and will cost something over $8,000.

The city has awarded the contract for building the trestle bridge across the right of way of the Northern Pacific, at Fourth street and Twenty-ninth avenue N. E. to D. D. Smith, of Minneapolis. The bridge contains one Howe truss span of 110 ft., and the balance of the 1,000 ft. is timber trestle. The contract price is $10,054.

The Edge Moor Bridge Works are busy erecting the bridges across the right of way of the Great Northern at Third and Main streets. This company also has the contract for several other bridges for the Great Northern.

Phillipsburg, Pa.—A new iron bridge is being erected by the Tyrone & Clearfield a short distance below its freight station at Phillipsburg. It will be completed in a few weeks.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads

In the Federal Court it appeared that a charter of the city of New Orleans provides, inter alia, that the common council shall have power to authorize the use of the streets for "horse and steam railroads." It is held that the words "horse and steam railroads" were not words of limitation, and that the council was empowered to grant such franchise to electric railroads.[1]

In New York it is held that the statute of 1890 permitting a railroad company to construct its road "across, along, or upon" any highway, contemplates only a casual or incidental occupation and use of the highways, and does not authorize a company to build its entire railroad along a highway between two villages.[2]

In Oregon the Supreme Court holds that where the statute makes the rates adopted by the railroad commissioners prima facie evidence that the same are reasonable, and a fair return on the value of the road, evidence that the rates are not a fair return on the amount of the bonded debt, capital stock, and current debts is insufficient to overcome the prima facie reasonableness of the rates adopted, unless it is also shown that the value of the road equals such outstanding liabilities.[3]

In Missouri it is held by the Supreme Court that a township tax levied by the court to pay bonds issued in aid of a railroad is not a county tax, within the meaning of a railroad company's charter exempting its stock from state and county taxes.[4]

Injuries to Passengers, Employes and Strangers.

In Indiana it is held by the Supreme Court that a United States railroad postal clerk, who has finished his regular run, and is on a train returning home, riding free on the strength of his photograph commission, in accordance with the custom of the railroad company under its contract to carry the mails, is a passenger, and entitled to damages resulting from the negligence of the railroad's employés, whether he is riding in a passenger car or is in the postal car assisting in handling the mails.[5]

In the Federal Court it is held that in an action against a railroad company for injuries resulting from a cold contracted by plaintiff while traveling, the failure of plaintiff, who was inexperienced in traveling, to call the attention of the company's employés to the cold condition of the car, before taken sick, would not preclude recovery, but its effect as bearing upon the question of contributory negligence should be left to the jury, to be determined from all the circumstances in the case.[6]

In Wisconsin the Supreme Court holds that the duty of a railroad to have its station platforms guarded and lighted so as to protect persons coming to the station to bid farewell to friends intending to leave on regular passenger trains does not extend to persons coming at an unusual hour with one who intends leaving on a freight in charge of stock, and who, although allowed the use of the waiting room, and allowed to load at the platform instead of in the yards, is not a passenger except in a very limited sense.[7]

In the Federal Court of Appeals, a shipper of cattle by rail, accompanied by a helper, went with them on the train, according for the custom of the railroad company. The two men went forward at a station where the train stopped to water, to look at an animal that was down (the conductor having told them that there would be time if they hurried up). The station was near a creek spanned by a bridge, and, when stopping to water, the engine was on the bridge. The bridge carried the main track and a side track, and was planked between the two tracks and between the rails, but on the outer side of the main track there was only a narrow footpath. The night was very dark, and the helper, after passing the front of the engine, stepped over the edge of the rail, and fell to the creek below. Shortly afterwards his employer was found beside him, dead. The station platform extended nearly to the water tank, and all the buildings and facilities for business were between the station and the bridge. The court holds, in an action to recover for the death of the shipper, that the lower court properly submitted the case to the jury, with instructions that it was mainly a question whether the bridge was such a part of the station grounds as that the shipper was entitled to use it for the purpose of looking after his cattle, and that the company was bound to see that proper planking and railings were maintained."[8]

In South Carolina the Supreme Court holds that where the statute allows a railroad to charge 25 cents additional to the regular fare if a passenger neglects to purchase a ticket, when the ticket office is open for half an hour preceding the arrival of a train, a passenger, on his refusal to pay such addition to the regular fare, is liable to immediate ejection from the train, whether or not he knew of such regulation.[9]

In North Carolina the deceased was ejected from a train early in the evening for failure to pay fare, and was found frozen the next morning. It appeared that he was intoxicated at the station where he got aboard. The conductor knew he was under the influence of liquor, heard him ask for food at the eatinghouse, and next saw him on the train, awake, and declaring he had neither money nor ticket. When told he must get off, deceased rose and got off without assistance. The temperature at the time was not freezing, although it got colder before morning. The place was near a dwelling, as required by statute, and about half a mile from the station. The Supreme Court rules that the conductor was warranted in supposing that deceased was not so intoxicated but that he could reach a place of safety, and hence there was no question of the railroad's negligence for submission to a jury.[10]

In Kentucky it was customary to furnish section men ordered to signal trains of danger with both a white and a red light, the white light being best adapted to show dangerous places in the track, and the red light to give signals with. In order to stop a train with a white light, it would be necessary to swing the light across the track, while with a red light the signal could be given from a point not on the track. The Court of Appeals rules that a failure to furnish such section hand with a red light was not such negligence as would give a cause of action against the company for his death where he was killed while on duty, if there is nothing to show that there was any danger to be signaled, or that he had any occasion to use a red light.[11]

In New York it is laid down that where a master directs his engineer to break in a new man to run an engine, and the latter in running it under the supervision of the engineer makes a mistake, causing injury to a third employé, it cannot be claimed that the injury was caused by a fellow servant.[12]

In Pennsylvania the plaintiff was injured while employed as a flagman on defendant's freight train, by being thrown by a jerk in the train from the rear car, while uncoupling an engine which had been pushing the train up a grade. The rear car was a box car, with a door cut in each end. Plaintiff alleged negligence in defendant in not providing a suitable caboose, with platform and railing at each end, from which he could safely discharge his duties. The evidence showed that such box cars were in common use as cabooses on defendant's and other roads; that plaintiff had been employed as brakeman and flagman by defendant for some time, and was as competent as any one to judge of the danger of a box car when used for a caboose. The Supreme Court holds that plaintiff accepted the risk incident to his employment, and could not recover.[13]

In Missouri the plaintiff attempted to cross a railroad track, and was standing on a side track, waiting for a train to pass on the main track. While thus waiting, he was struck by a train on the side track. If plaintiff had looked, he could have seen the train which injured him, when it was quarter of a mile away. The Supreme Court rules that plaintiff could not recover, though no signal was given by the approaching train.[14]

In Wisconsin it is laid down by the Supreme Court that no action will lie against a railroad for the death of plaintiff's intestate, resulting from his being run over by defendant's engine while crossing its track, where it appears that he failed to use the precaution of looking to see if any trains were approaching before trying to cross the track, and that he could have seen the train, and avoided it, had he looked.[15]

In Texas, the plaintiff's intestate, while drunk, lay down between the depot and the track at a place obscured by the platform so that he could not be seen by an approaching train, and there was no allegation or evidence that lights were needed at that point for the convenience of persons, or for moving trains. The Supreme Court rules that, in the absence of evidence, it could not be presumed that defendant company was negligent in failing to place lights at that point so as to discover persons in such unusual place, asleep or drunk.[16]

In New York the defendant's servants, while repairing its elevated railroad, allowed a heavy timber to strike the platform, knocking a piece therefrom, which fell on plaintiff below. The piece that fell was so rotten that it could be broken with the hand, and its condition was discoverable by ordinary inspection. The court holds the company liable.[17]

In New York it is ruled that one who undertakes to cross a railroad track to a station at a point where there is no walk or highway assumes all risk of accident, and is not entitled to recover, even though this may have been the usual point of crossing for himself and others.[18]

[1] Buckner v. Hart, 52 Fed. Rep., 835.
[2] Burt v. L. & H. F. R. Co., 21 N. Y. S., 482.
[3] State v. Southern Pac. Co., 31 Pac. Rep., 960.
[4] State v. H. & St. J. R. Co., 21 S. W. Rep., 14.
[5] C., C., C. & St. L. v. Ketcham, 33 N. E., Rep., 116.
[6] Hastings v. N. Pac. R. Co., 53 Fed. Rep., 221.
[7] Dowd v. C., M. & St. P. Ry. Co., 51 N. W. Rep., 21.
[8] Ill. Cent. v. Foley, 53 Fed., Rep., 459.
[9] Moore v. C. & G. R. Co., 16 S. E. Rep., 781.
[10] Roseman v. C. Cent. R. Co., 16 S. E. Rep., 766
[11] Wadlington v. N. N. & M. V. R. Co., 20 S. W. Rep., 783.
[12] Moylan v. Davids, 21 N. Y. S., 249.
[13] Davis v. B. & O. R. Co. (Pa. Sup.), 25 Atl. Rep., 498.
[14] Maxey v. M. Pac. Ry. Co., 20 S. W. Rep., 654.
[15] Hansen v. C., M. & St. P. Ry. Co., 53 N. W. Rep., 999.
[16] Prizwadosfskie v. Int. & G. N. Ry. Co. 20 S. W. Rep., 872.
[17] Anderson v. Manhattan Ry. Co., 21 N. Y. S., 1
[18] Adams v. N. Y., L. E. & W. R. Co., 21 N. Y. S., 681.

MEETINGS AND ANNOUNCEMENTS.

Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago, Burlington & Quincy, quarterly, 1¼ per cent., payable June 15.
Cleveland & Pittsburgh, quarterly, 1¾ per cent., payable June 1.
Columbus, Hocking Valley & Toledo, semi-annual, 2½ per cent. on the preferred stock, payable June 30.
North Pennsylvania, quarterly, 2 per cent., payable May 25.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Ashland, annual, Hudson, Wis., May 20.
Burlington, Cedar Rapids & Northern, annual, Cedar Rapids, Ia., May 23.
Canada Southern, annual, St. Thomas, Ont., June 7.
Cedar Falls & Northern, annual, Hudson, Wis., May 20.
Chesapeake & Ohio Southwestern, special, Memphis, Tenn., June 13, to approve of the purchase of the Hodgeneville & Elizabethtown.
Chicago & Eastern Illinois, annual, Chicago, June 7.
Chicago & Northwestern, annual, Chicago, Ill., June 1.
Chicago, St. Paul, Minneapolis & Omaha, annual, Hudson, Wis., June 3.
Compton Heights, Union Depot & Merchants' Terminal, annual, St. Louis, Mo., May 31.
Des Moines & Fort Dodge, annual, Des Moines, Ia., June 1.
Eau Claire, annual, Hudson, Wis., May 20.
Keokuk & Des Moines, annual, Des Moines, Ia., June 7.
Leamington & St. Clair, annual, St. Thomas, Ont., June 7.
Menominee, annual, Hudson, Wis., May 20.
Milwaukee, Lake Shore & Western, annual, Milwaukee, Wis., June 2.
Minneapolis, St. Paul & Sault Ste. Marie, annual, Minneapolis, Minn., June 6.
Mobile & Girard, special, Girard, Ala., June 7.
Mobile & Ohio, special, Mobile, Ala., May 29.
Nealsville & Northeastern, annual, Hudson, Wis., May 20.
Parry Sound Colonization, annual, Parry Sound, Ont., June 7.
Peoria, Decatur & Evansville, special, Peoria, Ill., June 30.
Pontiac Pacific Junction, special, 162 St. James street, Montreal, Que., June 17.
St. Joseph & Grand Island, annual, Elwood, Kan., June 13.
St. Louis, Alton & Terre Haute, annual, St. Louis, Mo., June 5.
St. Louis & Hannibal, special, New York City, May 26, to vote upon the purchase of the St. Louis, Hannibal & Kansas City.
Sarnia, Chatham & Erie, annual, St. Thomas, Ont., June 7.
Sault Ste. Marie & Southwestern, annual, Hudson, Wis., May 20.
Superior Short Line, annual, Hudson, Wis., May 20.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *International Association of Car Accountants* will hold its next annual convention at Indianapolis, June 19.

The *Master Car Builders' Association* will hold its annual convention at the Kent House, Lakewood, N. Y., commencing June 13. Applications for rooms should be made to J. B. Brady, Kent House, Lakewood, N. Y.

The *Master Mechanics' Association* will hold its annual convention at the Kent House, Lakewood, N. Y., commencing June 19.

The *Association of American Railway Accounting Officers* will hold its fifth annual meeting at the Auditorium Hotel, Chicago, commencing May 31.

The *Railway Agents' Association of North America* will meet at Old Point Comfort, Va., on Tuesday, May 16.

The *National Association of Car Service Managers* will hold its annual meeting at Chicago, May 23.

The *Train Dispatchers' Association of America* will hold its annual convention in Salt Lake City, Utah, June 20.

The *World's Railway Commerce Congress* in connection with the World's Fair at Chicago will hold a meeting at Chicago, June 19.

The *Association of Railway Telegraph Superintendents* will hold a meeting at Milwaukee, Wis., June 20.

The *Western Railway Club* meets at the rooms of the Central Traffic Association in the Rookery Building, Chicago, on the third Tuesday in each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 7.30 p. m.

The *Northwest Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month except during June, July and August, at 8 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Western Society of Engineers* meets at 78 La Salle street, Chicago, on the first Wednesday in each month, at 8 p. m.

The *Engineers' Club of St. Louis* meets in the Odd Fellows' Building, corner Ninth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Engineers' Society of Western Pennsylvania* meets at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month at 8 p.m.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The Denver Society of Civil Engineers meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday except during the months of June, July, August and September.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Tacoma Society of Civil Engineers and Architects* meets in its rooms, 201 Washington Building, Tacoma, Wash., on the third Friday in each month.

The Association of Engineers of Virginia holds informal meetings the third Wednesday of each month, from September to May inclusive, at 719 Terry Building, Roanoke, at 8 p. m.

American Society of Civil Engineers.

A regular meeting was held Wednesday evening, May 17. The first paper read was "The Detroit Union Depot Viaduct," by J. W. Schaub, M. Am. Soc. C. E., Engineer for the builders, the Detroit Bridge and Iron Works. The second paper was "Rainfall and River Flow," by Cyrus C. Babb, Jun. Am. Soc. C. E. There was little discussion of either paper.

Several German, French, Italian and Danish engineers were present as guests of the Society.

Engineering Association of the South.

On the occasion of the regular monthly meeting at Nashville, Tenn., May 11, the resident members extended their courtesies to the non resident members in an excursion to points of technical interest near Nashville. In the forenoon visits were made to the extensive new shops of the N., C. & St. L. R. R., to the city reservoir, and to the power plant of the combined street railroads. The party, about 60 in number, spent the afternoon in an excursion on the river, visiting the city pumping station, the most recently constructed electric light plant, the site of the lock now under construction on the Cumberland River and the three Cumberland River bridges. At the evening session, a discussion followed on "The Durability of Yellow Pine." Mr. Hunter McDonald thought that yellow pine is not so durable now as formerly, ascribing as a reason, among others, the common practice of tapping pine for turpentine, also the fact that much of this timber comes from "old field pine," a secondary growth which has followed the clearing of the original forests. He thought erroneous the theory that tapping removes the turpentine from the sap only and not from the heart, and that the whole stick is made more porous for the absorption of moisture. Some bridge timbers of pine not tapped were mentioned which were sound after 14 years' service while nearly all pine timber now has to be renewed in five or six years. He does not now paint wooden members of bridges, but houses them, allowing free air circulation. In the Tennessee River bridge at Johnsonville are housed timbers, sound after 21 years' use. He believes that if timber could be protected from the weather two years, then well painted, it would add four years to its usefulness. He finds more difficulty in judging when a stick is unsafe from decay than in protecting it, and thinks some practical test for timber in place would be of great benefit.

Mr. W. C. Smith agreed that the timber, when from original forest and not tapped, lasted better than otherwise, and called attention to the hastening of dry rot by confining timber in walls; the confined ends of joists have rotted in nine months when the rest was still good; in his practice he either leaves an air space around the ends of joists or builds projecting bearings for them. Poplar lumber sawed from river rafts he found decayed in two years when exposed to the weather, and at the same time lasted well on interiors. A number of other interesting facts were elicited by the discussion.

The next meeting is called for June 8, at the rooms of the association, Cumberland Publishing House Building, Nashville, Tenn.

American Institute of Electrical Engineers.

The annual meeting of the Institute will be held at the headquarters of the Institute, No. 12 West Thirty-first street, New York, at 4 p. m., Tuesday, May 16.

In the evening a subscription dinner will be served at 41 West Thirty-first street.

The general meeting will be held at 12 West Thirty-first street on May 17. Following is the programme:

Morning Session: 10 o'clock.—The following papers will be read:

(1.) "On the Behavior of Fuse Metals in Direct and Alternate Current Circuits," by Mr. Charles P. Matthews, of Cornell University, Ithaca, N. Y.

(2.) "A Modified Deprez d'Arsonval Galvanometer," by Lieut. Charles D. Parkhurst, of Watervliet Arsenal, West Troy, N. Y.

(3.) "The Variation in Economy of the Steam Engine Due to Variation in Load," by Prof. R. C. Carpenter, of Cornell University, Ithaca, N. Y.

(4.) "An Automatic Printing Speed Counter for Dynamo Shafting," by Prof. Geo. S. Moler, of Cornell University, Ithaca, N. Y.

Afternoon Session:

(5.) "Practical Aspects of Electrical Resonance," by Dr. M. I. Pupin, of Columbia College, New York City.

(6.) "The World's Electrical Congress of 1893." Discussion of the Provisional Programme prepared by the Institute Committee.

(7.) "A New Method and Apparatus for Measuring Conductivity," by Mr. E. G. Willyoung, of Philadelphia.

(8.) "The Heating of Armatures," by A. H. and C. E. Timmerman, of Cornell University, Ithaca, N. Y.

New England Railroad Club.

At the meeting of Wednesday evening, May 10, 1893, the chair was occupied by President Chamberlain. On motion of Mr. Kent, it was voted that the meetings of the Club for June, July and August be omitted. On motion of Mr. Marden, it was voted that the Executive Committee be authorized to call a special meeting of the Club, if they see fit, with reference to an excursion or other entertainment during the summer months.

Mr. Marden gave notice that the Fitchburg road had in process of construction an Air Brake Instruction car, which, when completed, would be manned by a capable instructor and assistant, for use on that road; and when not so in use he offered the use of it to neighboring roads, should they desire it, at a very reasonable rate, the car to be fitted with an independent boiler. On motion of Mr. Lauder, the thanks of the Club were extended to Mr. Marden, and through him to the Fitchburg road, for this kind offer.

The discussion of the evening is reported on another page.

Western Railway Club.

The regular May meeting of the Western Railway Club has been postponed until Tuesday, May 30, and will be held in Room 750 The Rookery, at 2 p. m. The subjects for discussion are Master Car Builders' Couplers, and Grab Irons on Freight Cars.

Order of Railway Conductors.

The annual meeting of this organization was held in Toledo last week. The chief officer, E. E. Clark, of Cedar Rapids, Ia., was re-elected for three years.

PERSONAL.

—Mr. William B. Phelps, for many years Superintendent of the Oswego and Syracuse Division of the Delaware, Lackawanna & Western road, died at Oswego, N. Y., May 17, at the age of 76.

—Mr. H. G. Thompson, of the Gulf, Colorado & Santa Fé, has resigned his position as General Passenger Agent and will go to the California Southern Railroad, with headquarters at Los Angeles, Cal.

—The title of the new office to which Mr. Arthur Hale, of the Pennsylvania Railroad, has been appointed, as noted in our last issue, is "Special Agent of the General Superintendent of Transportation," with headquarters at Philadelphia.

—Mr. E. B. Ives, M. Am. Soc. C. E., has been appointed engineer of the City Railway Company of Philadelphia. This company is developing an extensive system of trolley lines in Philadelphia. Mr. Ives has for some years made a specialty of electrical engineering.

—Hon. Joseph B. Colton, of Duluth, has been appointed attorney for the Duluth, Messabe & Northern road. Mr. Colton is not yet thirty years of age but is already one of the leaders of the bar in Northern Minnesota. As a member of the lower house of the last Minnesota Legislature he made an excellent record.

—Mr. Henry L. Leach, formerly Superintendent of the Hinckley Locomotive Works, died at Boston last week in his seventy-third year. For the last 10 years Mr. Leach has been engaged in the railroad supply business in Boston, representing as agent many well known firms. He also controlled Leach's sand-feeding apparatus for locomotives.

—Mr. Charles B. Peck was last week elected Chairman of the Texas Car Service Association, Maj. A. H. Swanson, who had been elected to that office, having declined. Mr. Peck is at present Assistant General Manager of the San Antonio & Aransas Pass road. He has appointed as his assistant Mr. R. S. Collins, formerly General Freight Agent of the Houston, East & West Texas Railroad. The headquarters of the Car Service Association will be at Houston, Tex.

—Mr. Albert W. Nickerson, formerly President of the Mexican Central, died at his home, in Dedham, near Boston, on May 17. Mr. Nickerson was born at South Boston in 1840. His father was one of the largest stockholders in the Atchison road. Thomas Nickerson, his uncle, was the first President of the road, and Albert Nickerson was from 1883 to 1888 a member of the Board of Directors and Chairman of the Finance Committee under the presidency of W. B. Strong.

—Mr. George C. Smith tendered his resignation as Assistant General Manager of the Missouri Pacific last week. Mr. Smith has been Assistant General Manager of the system for nearly three years, or since Mr. Clark's election to the Presidency of the Union Pacific. He was formerly assistant to Mr. Clark when he was General Manager of the Missouri Pacific and was made Assistant General Manager in 1892, about the time that Mr. Clark was appointed General Manager of the Union Pacific. Mr. Smith has been with the company for 12 years. He was at one time secretary to First Vice-Presidents Hayes and Hoxie, and assistant to First Vice-President Clark.

—Mr. J. Waldo, First Vice-President and Traffic Manager of the Missouri, Kansas & Texas road, has resigned, on account of ill-health. It is generally understood that differences of opinion among the officers on matters of policy in traffic affairs have existed for some time. Mr. D. Miller, formerly Traffic Manager of the Queen & Crescent Route, will succeed Mr. Waldo as Traffic Manager of the Missouri, Kansas & Texas. Mr. Miller has a thorough knowledge of Southwestern traffic affairs, having been Traffic Manager of the St. Louis, Arkansas & Texas in 1890, and General Freight Agent for some years previously. Since 1890 he has been Traffic Manager of the Queen & Crescent Route.

—Mr. Augustus Woodbury Locke, a distinguished and highly esteemed civil engineer, died at his home in North Adams, Mass., about nine o'clock Sunday evening, May 14. Mr. Locke was the son of Gardner T. Locke, of Rye, N. H., and was born in that town Feb. 26, 1846. He was educated at the Pittsfield (N. H.) Academy, and at the Massachusetts Institute of Technology. He served in the navy during the war, and after his discharge took up civil engineering. After preliminary work he was appointed assistant engineer on the Hoosac Tunnel, serving in that capacity from 1868 to 1876. He served as engineer of maintenance of way on the Troy & Greenfield road until 1878, when he was appointed by Governor Long Manager and Chief Engineer of the Troy & Greenfield railroad and Hoosac Tunnel. He held this position until 1887, when the road and tunnel were sold to the Fitchburg Company. When he retired he received public commendation through Governor Robinson for his able management of affairs. He then entered upon private business, and subsequently was chairman of the special commission of the state board on the abolition of grade crossings and also on special commissions at Northampton, Worcester, Buffalo, N. Y., and Springfield. He was a prominent member of the American Society of Civil Engineers, the Boston Society of Civil Engineers, Sanford Grand Army Post and Greylock Lodge of Masons. He was Chairman for several years of the Board of Health of North Adams, and was also recently elected a member of the newly established Board of Road Commissioners. He was married in February, 1876, to Martha P. Perkins, of Hampton, N. H. A widow and four children and two brothers, Parsons D. Locke, of Rye, N. H., and Frank B. Locke, of Boston, survive him. The latter was in partnership with him.

ELECTIONS AND APPOINTMENTS.

Bellefonte Central—F. H. Thomas, of Philadelphia, succeeds T. A. Shoemaker as Superintendent. He has already taken charge of this road, with headquarters at Bellefonte, Pa.

Berlin.—The following directors were elected at the election on May 1: President, J. B. Washington, Pittsburgh; Secretary, A. W. Black, Pittsburgh; Treasurer, W. H. Ijams, Baltimore. Directors: W. H. Koontz, Somerset, Pa.; S. Philson, Berlin, Pa.; A. M. Ross, Confluence, Pa.; J. Reed, Torrance, Pittsburgh; S. C. Hartley, Meyersdale, Pa. The road is an operated line of the Baltimore & Ohio in Pennsylvania.

Boyne City & Southeastern.—The incorporators of this company, chartered in Michigan last week, are as follows: William H. White, Thomas White, James A. White, George White, Robert V. White, Lyde White and Albert E. Campbell, all of Boyne City, Mich.

Brigantine Beach.—The following officers were elected at the meeting held May 11, at Brigantine, N. J.: R. B. Roosevelt, New York, President; I. A. McKee, Vice-President; R. B. Roosevelt, Jr., Secretary and Treasurer; M. Lippman, General Manager.

Buffalo, Rochester & Pittsburgh.—E. H. B. Kopperman, formerly Foreman of Locomotive Repairs of the Buffalo Creek shops, has been made Master Mechanic in charge of the shops at that point.

California & Nevada.—The present directors of this road are: J. S. Emery, President; E. A. Phelps, Secretary; Abner Doble, J. J. Scrivner, George W. Schell, Alton H. Clough and William Thomas.

Central of Georgia.—Eugene Bushard has been recently appointed General Foreman of the Savannah shops of this company. Mr. Bushard, who has had rapid promotion, served his apprenticeship under Clarence H. Howard at the St. Louis shops of the Missouri Pacific Railroad.

Chesapeake & Ohio.—J. M. Gill, Superintendent of the Huntington Division, has been promoted to be Superintendent of the Huntington, Cincinnati, Lexington and Big Sandy divisions.

Cleveland, Lorain & Wheeling.—The resignations of Master Car Builder George Butts and Master Mechanic C. H. Warbinton having been tendered, F. H. Stark has been appointed in the former's place and J. A. Graham to the latter's position.

Delaware & Hudson Canal.—The following directors were elected at the annual meeting held in New York City, May 9: Legrand B. Cannon, James Roosevelt, Robert M. Olyphant, Benjamin H. Bristow, R. Suydam Grant, Wm. H. Tillinghast, Alfred Van Santvoord, James A. Roosevelt, Alexander E. Orr, Oliver P. C. Billings, Samuel Spencer, Cornelius Vanderbilt, Chauncey M. Depew. The officers elected were: President, Robert M. Olyphant; Vice-Presidents, Legrand B. Cannon, New York; Horace G. Young, Albany, N. Y.; Secretary, F. Murray Olyphant, New York.

Duluth, Messabe & Northern.—Hon. Joseph B. Colton has been appointed Attorney, with headquarters at Duluth.

Eastern Railroad Association.—At the annual meeting of the Association held on May 10, the following Executive Committee and officers were elected for the ensuing year: *Executive Committee*, William D. Bishop, A. A. Folsom, James Moore, R. Neilson, Theodore N. Ely, Charles E. Pugh, H. F. Kenney, J. M. Toucey and G. B. Hazlehurst; *Officers*: President, Hon. William D. Bishop, Bridgeport, Conn.; Vice-President, Theodore N. Ely, Philadelphia; Treasurer, Albert A. Folsom, Boston; General Counsel, Robert J. Fisher, Washington, D. C., and Secretary, John J. Harrower, Washington, D. C.

Elmira, Cortland & Northern.—The directors of the company have elected the following officers: President, George S. Edgell; Vice-President, Henry W. Maxwell; Secretary, Charles M. Reynolds; Treasurer, William J. Hehre, all of New York. President Edgell is a son-in-law of Austin Corbin.

First & Second Pool.—The company has been chartered in Pennsylvania by W. J. Hammond, of Pittsburgh, President, and W. E. Funston, J. H. McRoberts, Robert R. Hammond, G. W. Crawford, Harry C. Wettinger and Wm. D. Evans, all of Pittsburgh.

Gainesville, McAlester & St. Louis.—The following directors were elected at the annual meeting held in Gainesville, Tex., May 3: William Hudson, R. D. Gribble, F. M. Dougherty, F. A. Tyler, Jr., George Y. Bird, D. L. Painter, C. Newcombe Stevens, J. M. Lindsay and Philip Lewin. The officers are: J. M. Lindsay, President; R. D. Gribble, Vice-President; Horace B. Fletcher, Secretary; George Y. Bird, Treasurer.

Georgia Railroad & Banking Co.—At the annual meeting held in Augusta, Ga., May 10, the following directors were elected: William M. Reese, Joel A. Billups, H. D. McDaniel, H. H. Hickman, N. L. Hutchins, J. H. Alexander, A. W. Calhoun, T. W. Coskery, Leonard Phinizy, W. E. McCoy, James White, R. D. Spalding, Jacob Phinizy, G. D. Thomas, W. A. Latimer, G. A. Speer. C. H. Phinizy was re-elected President.

Gulf, Colorado & Santa Fe.—W. S. Keenan, chief clerk to W. F. White, Passenger Traffic Manager, will succeed H. G. Thompson as General Passenger Agent of this road.

G. A. Hancock, Master Mechanic of the San Antonio & Aransas Pass, has been appointed Master Mechanic of this road, filling the vacancy caused by the resignation of Master Mechanic Joseph Billingham.

S. K. Wheeler, Superintendent of Transportation, has tendered his resignation, and P. T. Downs, Division Superintendent at Cleburne, Tex., has succeeded Mr. Wheeler.

A. J. Davidson, recently Trainmaster of the San Antonio & Aransas Pass, has been appointed Division Superintendent of the road at Cleburne, to fill the vacancy caused by the promotion of P. T. Downs.

Missouri, Kansas & Texas.—At the annual meeting at Parsons, Kan., May 17, the following directors were elected: John D. Rockefeller, W. E. Rockefeller, William Rockefeller, Henry Grace, Colgate Hoyt, Henry W. Poor, William Bond, William Dowd, Joel F. Freeman, Simon Stern, Joseph K. Bond, all of New York; Thomas

C. Purdy, of St. Louis; F. H. Fillmore, of Milwaukee; J. H. McDonald, of Fort Scott, Kan.; Alfred J. Poor, of Chapman, Kan.; Lee Clark, of Parsons, Kan., and H. J. Demarest Oyens, of Amsterdam, Holland. Henry C. Rouse was re-elected Chairman of the Board and President of the company, and the following general officers were elected: Thomas C. Purdy, Vice-President and General Manager, with headquarters at Parsons, Kan.; William Dowd, Vice-President, and Charles G. Hedges, Comptroller, Secretary and Treasurer.

The office of Chief Engineer of the lines in Texas will be abolished on June 1, G. M. Jarvis, who has held that office, having resigned.

Missouri Pacific.—S. B. Schuyler has been appointed Assistant General Auditor of the road, with office in St. Louis.

New York & Harlem.—The stockholders of the company elected the following directors on May 17: Cornelius Vanderbilt, W. K. Vanderbilt, Frederick W. Vanderbilt, S. F. Barger, Chauncey M. Depew, C. C. Clarke, John B. Dutcher, John E. Burrill, F. P. Freeman, Samuel D. Babcock, Alfred Van Santvoord, Robert Schell and W. H. Robertson.

New York, Lake Erie & Western.—Thomas H. Pindell, formerly Chief Dispatcher of the Eastern Division, has been placed in charge of the Transportation Department, with headquarters at Jersey City. The office of Superintendent of Transportation was recently made vacant by the resignation of W. H. Starr. Mr. Pindell reports direct to General Superintendent J. R. Fitch.

Northwestern Coal Railway Co.—This company has been chartered with headquarters at St. Paul, Minn., for the purpose of building terminal tracks and docks at the head of Lake Superior for handling coal. The officers are: E. N. Saunders, President; C. J. A. Morris, Vice-President, General Manager and Chief Engineer, and E. L. Shepley, Secretary and Treasurer.

Ohio River.—The ninth annual meeting was held at Parkersburg, W. Va., last week. The following were elected directors: E. W. Clark, S. W. Cotton, Jr., Philadelphia; C. M. Pratt, W. P. Thompson, H. H. Rodgers and C. W. Harkness, New York; J. G. Fair, San Francisco; Col. G. W. Thompson, J. N. Camden, W. N. Chancellor, B. D. Spillman, J. B. Neal, Parkersburg, W. Va. The directors elected the following officers: President, George W. Thompson; Secretary, W. N. Chancellor; General Manager, G. Clinton Garden; Treasurer, W. M. Trevor.

Philadelphia Belt.—At the annual meeting held in Philadelphia, Pa., May 9, the following directors were elected: Wm. Singerly, James Dobson, E. C. Knight, Jr., Wharton Barker, Charles H. Cramp, Walter F. Hagar, E. A. Hancock, William H. Jenks, Calvin Pardee, William W. Justice and Francis B. Reeves. The officers are: President, Francis B. Reeves; Vice-President, Walter F. Hagar; Treasurer, Richard Tull; Secretary, John J. Curley.

Pittsburgh, Fort Wayne & Chicago.—At the annual meeting of the company held in Pittsburgh, May 17, Charles Speer, of Pittsburgh; Edward P. Williams, of Fort Wayne, and John C. Kennedy, of New York, were re-elected directors.

Pittsburgh Virginia & Charleston.—At the annual meeting held in Philadelphia, Pa., the following directors were elected: George B. Roberts, N. Parker Shortridge, W. H. Barnes, John P. Green, W. L. Elkins, A. M. Byers, Chas. E. Speer, W. J. Howard, George V. Lawrence, Charles L. Taylor, Henry D. Welsh and W. A. Patton. Samuel Rea was elected President, and D. P. Corwin Secretary.

Port Royal & Western Carolina.—The directors elected by the minority stockholders last week have elected D. B. Dyer, of Augusta, Ga., President; R. C. Watts, of Laurens, S. C., Vice-President, and S. P. Todd of Laurens, S. C., Secretary and Treasurer.

St. Louis, Chicago & St. Paul.—At a meeting of the Board of Directors of the company last week the following named officers were elected: President and Treasurer, Charles E. Kimball; Vice-President and Solicitor, Joseph Dickson; Secretary, Eleneious Smith; General Superintendent, Isaac W. Fowler. Major Henry O'Hara, formerly President, tendered his resignation as a director, which was accepted. Mr. Kimball is a member of the house of Post, Martin & Co., of New York. Mr. Fowler, whose appointment has been previously announced, was formerly General Superintendent of the Central New England & Western.

Sioux City & Northern.—The annual meeting was held in Sioux City, Ia., May 10, at which the following directors were elected: A. S. Garretson, E. Haakinson, John Hornick, C. L. Wright, E. H. Hubbard and James P. Wall, all of Sioux City, Ia.

Sioux City, O'Neill & Western.—The annual meeting was held in Sioux City, Ia., May 10, at which the following directors were elected: A. S. Garretson, E. H. Hubbard, C. L Wright, J. A. Seaman, John Hornick, W. H. Goodwin, Jr., and E. Haakinson, all of Sioux City, Ia.

Tionesta Valley & Salmon Creek.—The first board of directors of this Pennsylvania company are: T. D. Collins, of Nebraska, President; Howard M. Alleson and Everett S. Collins, Pittsburgh; Orion Siggins, West Hickory, Pa.; Mary S. Collins and Kennedy L. Haugh, Nebraska, Pa.

Ulster & Delaware.—At a directors' meeting of the railroad in Rondout, N. Y., May 17, Horace G. Young, of Albany, was elected President in the place of the late Edwin Young, his brother.

Utah Central.—W. W. Mackintosh having resigned as General Freight and Passenger Agent, the duties of that office will be performed by T. J. Mackintosh, General Superintendent. C. W. Hardy, Chief Engineer and Roadmaster, has also resigned.

Wilmington Sea Coast.—Capt. John R. Nolan has resigned as General Manager of the railroad, and Capt. John H. Daniel has been appointed General Manager in his stead, with office at Wilmington, N. C.

RAILROAD CONSTRUCTION, Incorporations Surveys, Etc.

Brainerd & Northern Minnesota.—Chief Engineer Arms, of this road, which is being constructed into the interior of the State of Minnesota, in the direction of Leech Lake, states that the definite location has been completed to the shore of Leech Lake, from the present terminus, which is near Pine Mountain Lake, over half the distance from Brainerd, Minn. The company has been operating about 50 miles of line since last fall, and will probably complete as much more this fall. A portion of the present line is to be rebuilt a few miles eastward from its present location in order to secure an easier grade. The actual point of reaching Leech Lake will probably depend upon the location of the Great Northern line from Park Rapids to Leech Lake.

Brooklyn, New York & Jersey City.—This company has been formed by the consolidation of the New York, New Jersey & Eastern and New York & New Jersey Underground railroads. Charles B. Thurston, of Jersey City, President of an auxiliary company of the Pennsylvania in New Jersey, is President of the new company. The other officers are: B. M. Shanley, of Newark, N. J., Vice-President; W. A. Patton, of Radnor, Pa., Secretary and Treasurer; William J. Hehre, Everett R. Reynolds, of New York City; E. B. Gaddis, Author E. Sanford and Thomas F. Brice, of Newark, N. J.; O. J. Derousse, of Philadelphia, directors. William J. Kelly is Secretary and Treasurer of the two roads which are consolidated. The line, if it is ever completed, will run between the terminus of the Long Island Railroad at Flatbush and Atlantic avenues, Brooklyn, and Jersey City, connecting at one end with the Long Island, and at the other with the Pennsylvania Railroad.

Burrard Inlet & Fraser Valley.—The locating engineers on the line from Vancouver, B. C., south to Sumas, Wash., on the Northern Pacific, are encountering considerable difficulty in procuring a suitable route east of Langley. Several lines have been run, and it is understood a suitable one has at last been selected. Work on clearing the right of way will soon begin.

California & Nevada.—The company has applied to the Alameda County Supervisors for a franchise for a double track road, in place of the present single track franchise. It is the intention to proceed at once with the work of improving the road now in operation between Emeryville, Cal., and Moraga ranch, a distance of 22 miles.

Canadian Pacific.—Superintendent White says that work on the uncompleted portions of the "Soo" extension to the International boundary line will be commenced this week. The contracts for grading have been let to Egan Bros., Dennison, Keith, Strevel and McAnnary & Goudaur. About 60 miles is still to be graded and the work will be completed about July 18. About 160 miles of the grading has still to be surfaced and track laid, but the work will be completed so that the road will be in operation Sept. 1.

Cape May.—The projectors of the new Cape May railroad, who have been having surveys made of the proposed route, have made an offer to the Pennsylvania Railroad Co. for the purchase of the defunct Philadelphia & Seashore road, which was purchased at Receiver's sale, at the direction of General William J. Sewell, for the Pennsylvania Railroad. Accompanying the offer was deposited a certain sum of money, but the present owners have not yet taken any definite action on the offer. The new line has been surveyed from Landisville to Cape May, 41 miles.

Central of New Jersey.—A party of engineers for several weeks past have been surveying the route of a proposed spur of the Long Branch division which shall reach the large brick and tile factories on the Raritan River west of Perth Amboy, N. J. The new branch will be two or three miles long, and will have a large freight traffic. The officers of the company deny that there is any intention of extending the road to New Brunswick or Bound Brook, N. J.

Central of Pennsylvania.—Work was commenced May 11 with a force of 300 men which will be increased to 2,000 in a few days. The line is to be 30 miles in length and to extend from Bellefonte, Centre County, northeast, to Mill Hall, where it will connect with the Beech Creek, near the old Washington furnace, and along Fishing Creek. The building of nine or ten iron bridges will be necessary. Valuable iron ore will be reached in the Nittany Valley, and much valuable timber.

J. I. Higbee, of Watsontown, Pa., has the contract for the grading. It is expected to have the line in operation within six months. W. L. Ross, of Philadelphia, is President of the company, William J. McHugh, of Philadelphia, Secretary and Treasurer; John W. Gehart, of Bellefonte, is Superintendent of Construction, and H. E. Richter, Chief Engineer. The general office is at 304 Walnut street, Philadelphia. Work was commenced May 15 at different points along the line.

Central Pennsylvania & Western.—Surveyors are still at work on the location of the extensions, and at least one party will remain in the vicinity of Bloomsburg all summer. The surveys have now been completed from Turbotville, Pa., near Williamsport, to Berwick, and in a few days the line from Berwick to Bloomsburg will also be finished. Another corps is working from Bloomsburg east. At bridge 28 the line runs under the Lehigh Valley and over the Central of New Jersey roads, and across to the Lehigh River at the mouth of Pine Run. It follows the Lehigh up to the Tobyhanna River and from there to Houser's Mills, where it connects with the Wilkes-Barre & Eastern, now building.

Chicago, Rock Island & Pacific.—The tracklaying on the Texas extension south of Bowie has been completed through Chico, Tex., a town about 25 miles south of Bowie, and construction trains are running to that point. The work has been completed for a long distance beyond this, and the contractors are working within 30 miles of Fort Worth, Tex. The work is going along very rapidly now, but some delay has been caused by a failure to receive construction material when needed.

Chicago, St. Paul, Minneapolis & Omaha.—Winston Bros., of Minneapolis, began work this week on the extension of the Ponca branch to Newcastle, Neb. The work is very light. The new line will be 10½ miles long.

Clayton & Pea Ridge.—The work of construction on this new railroad will begin in a few days, and it is expected that the road will be in operation during the summer. The line runs from Clayton into valuable coalfields in Adams and Brown counties, Ill., near Huntsville, and will be 12 miles long. The D. M. Halsted Construction Co., of Chicago, are the contractors.

Cornwall & Lebanon.—A belt line will be constructed around East Lebanon, Pa., shortly.

Everett & Monte Cristo.—The tracklaying, which was completed across the second crossing of the Stillaguamish River, is now being completed rapidly towards Monte Cristo, Wash. Until recently the construction work through the Stillaguamish Cañon has been delayed by the heavy snows on the mountains, as the contractors were unable to do any work above the snow line and could only advance the construction as the snow line receded up the mountain.

First & Second Pool.—A company was chartered at Harrisburg, Pa., May 12, under this name, to build a steam road from a point on the Monongahala River, near the mouth of Thompson's Run, in Mifflin Township, Allegheny County, to near Mendelshon, on Peter's Creek, a distance of seven miles. The capital stock is $70,000, and W. J. Hammond, of Pittsburgh, is President.

Florence & Cripple Creek.—The charter of this company was issued at Denver, Col., last week. The new company is a reorganization of the Florence, Cripple Creek & State Line, with the same officers. The proposed road has been surveyed and it is reported that the contracts for building between Florence, Col., and the Cripple Creek mining region, 40 miles, are practically settled. William A. Johnson is President.

Great Northern.—The officials have definitely decided to change the location of the road through the city of Spokane, Wash. The change which is to be made is in the location of the line near the west city limits. Trains through the city now run over the tracks of the Union Pacific and the Seattle, Lake Shore & Eastern. The line through Spokane will be about three miles long.

Gulf, Beaumont & Kansas City.—General Manager J. H. Kirby, who has just returned to Houston, Tex., from Boston, confirms the report that arrangements have been concluded for building 80 miles of road north of Beaumont, Tex. The rails have been ordered, and the contracts will be let early in June, when the engineers will have the profiles completed. They are now 25 miles north of Beaumont, and are looking for a good crossing of the Neches River. By building 80 miles of road the company will reach the granite and sandstone quarries in Jasper County. The road will pass through a fine timbered country, all of which is controlled by the Texas Pine Land Association, which company is building the road.

Mexico, Cuernavaca & Pacific.—The contractors are now rapidly pushing the construction work on this road from the City of Mexico. Wilson & Casad, of the City of Mexico, are the contractors. About 30 kilometres of line from the city of Mexico to Contreras is graded, and about 20 kilometres of track is laid. The work on the first division, as located, is moderate, there being only a few kilometres on the mountain division that are heavy. The maximum grade is 132 ft. a mile, and the maximum curvature is 10 deg. compensated. The mountain division is very heavily timbered, and affords all ties and bridge timber necessary, besides fuel in almost unlimited quantity. The Cuernavaca Valley, through which the road is to be built, is one of the richest sugar districts in Mexico. The total length of the proposed road is about 300 miles. The line has been located to Cuernavaca, Mex., and preliminary lines have been run to the Pacific Coast. The contract has been let for the section from Mexico to Cuernavaca, Mex. The present officers of the company are: J. H. Hampson, President; D. B. Smith, Vice-President and General Manager; Charles Wheeler, Denver, Secretary, and W. O. Staples, of City of Mexico, Treasurer.

Minneapolis, St. Paul & Sault Ste. Marie.—General Manager Underwood had a conference with General Manager Shaughnessy of the Canadian Pacific at Sault Ste. Marie last week. Mr. Underwood states that the work of extending the Soo Line 180 miles, from its present terminus at Cathay, N. D., to the International boundary, is being pushed with all possible vigor. The contractors have 30 miles ready for the track now. The new extension will be completed Aug. 1. It will strike the boundary at a point near longitude 104 deg. W., and will be met there by an extension of the Canadian Pacific, which is being built from Pasque, Man., a point on the main line about 100 miles from the boundary. The two roads will be joined near Murdered Scout Mound.

Monterey & Fresno.—Col. A. W. Jones, of Kansas City, President of the company, has recently returned to California and states that he has concluded arrangements for funds for building the line. He says that the location of the line will be made as soon as the right of way question is fully settled and the counties vote the aid which the company asks. The right of way through San Benito County has been secured for 60 miles, and also through Monterey County, except for 15 miles. The road is projected to extend from the port of Monterey, on the Pacific Coast, through the towns of Hollister and Salinas to Fresno, Cal., about 160 miles.

New Roads.—A proposition has been made to the business men of Houston, Miss., by the Buffalo Construction Company, to build a narrow gauge railroad from Okolona, Miss., to Houston, a distance of 20 miles. A donation of $20,000 will probably be granted and work be begun at an early day. The new road will connect with the Mobile & Ohio at Okolona.

Surveyors are now at work on a route from New Florence five miles southwest to Ligonier, Pa. They are following the route surveyed several years ago by Pennsylvania Railroad engineers and passing through a section rich in coal and convenient to standing timber.

Northwestern Coal Railway Co.—This company will build at Superior, Wis., about 12 miles of track to connect its docks, now under construction, with the various railroads reaching the head of Lake Superior. The contract for this work has been let to Messrs. McMullen & Morris, of St. Paul, Minn. C. J. A. Morris, of St. Paul, is General Manager and Chief Engineer.

Ohio Southern.—Work on the Lima extension is progressing as fast as it is possible to get men to do the work. The grading has been greatly retarded by the recent wet weather, and the contractors are trying to make up for lost time. It was hoped to have the road completed to Lima, by July 1, but the delay caused by the wet weather will probably postpone it beyond that time. The extension is about 60 miles long.

Panther Creek.—The Secretary of State at Charleston, W. Va., last week issued a charter to this railroad, which is to begin at Beans Island, Upshur County, and extend along Middle Fork River and Jenks' Fork of Middle Fork River through Randolph County, W. Va. The principal office is to be in Buckhannon, Upshur County. The incorporators are A. M. Winchester, J. D. Rowles, C. C. Vanderhoff, U. G. Young and A. M. Poundstone, all of Buckhannon, W. Va.

Portland, Monterey & Gulf.—All construction work on this road has been suspended and the laborers discharged. The cause of this action is not known. The grading had commenced at Portland, Tex., and was

progressing on the first section toward Sharpsburg, Tex.

Portland & Rumford Falls.—About 125 men are now at work on the grading for the Mechanic Falls extension. John Berry, of Fayville, Mass., who has the contract, has only recently recommenced the construction work and will soon increase his force. The extension is from Mechanic Falls easterly to Poland' Springs Junction, on the Maine Central road, about 12 miles.

Raven & Springfield.—Articles of incorporation of the company were filed in Illinois last week. A road is proposed from the state line, near Raven. The company is to purchase that portion of the Indianapolis, Decatur & Springfield which is situated in Illinois, a company is to be incorporated in Indiana to purchase the portion of the road in that state, and the two companies will then be consolidated as the Indianapolis, Springfield & Western. The incorporators are Thomas B. Atkins, New York; John K. Warren, Henry P. Page and J. L. King, of Decatur.

Tionesta Valley & Salmon Creek.—The charter for this company was filed at Harrisburg, Pa., last week. The road is to extend from Ross Run Railroad Bridge, Forest County, Pa., to Kellettville, a length of five miles. Truman D. Collins, of Nebraska, Pa., is President.

Tivoli Hollow.—This company was incorporated at Albany, N. Y., May 15, with a capital stock of $32,500, to build a standard gauge steam road from the New York Central tracks near the Tivoli Lakes to the east side of Broadway, in Albany, a distance of 1½ miles. The directors are W. B. Van Rensselaer, F. A. Harrington, of Albany; H. Walter Webb, John M. Toucey and Ira A. Place, of New York City. The road is to be constructed as a branch from the New York Central road to the proposed bonded warehouses to be erected on the old Van Rensselaer Manor grounds in Albany.

GENERAL RAILROAD NEWS.

Dominion Atlantic.—The bill to enable the Windsor & Annapolis Railroad to purchase the Western Counties road has passed the Nova Scotia House of Assembly. The consolidated railroad, which is to be known as the Dominion Atlantic, will operate in all 235 miles.

Grand Trunk.—The half-yearly general meeting was held the last week of April, in London. Sir H. W. Tyler, who presided, observed that he did not know any occasion on which they had previously met when they had greater disappointment to record than at present. The half-year had not been favorable for passenger business for many reasons, and the number of passengers carried had been 97,000 less, and the receipts showed a diminution of £12,700. On the other hand the express business, which they took over from January 1, 1892, showed an increase of £15,000 for the year, a great portion of which was earned in the half-year. As regarded the mails, they had been in the habit of receiving about £69,000 a year for their conveyance, but the Government had agreed to increase this payment by £6,179 per annum. On freight, although they had carried 93,000,000 tons more one mile, the increased receipts on account of this extra tonnage had been only £29,700. The rates had been raised to some extent, and had it not been for the disastrous blizzards and severe weather in the first three months of this year they would have already felt the benefit of the advance. Their hope in the future must therefore not lie in further economies in the working, but in the restoration of rates. The through traffic had been carried at as low as 0.55 cent per ton per mile. The Toronto station would cost them £150,000, but the Canadian Pacific Company had to pay four per cent. on half the value of the present station, which belonged to the Grand Trunk Company, and four and one-half per cent. upon all expenditure made by the company on the new station for joint purposes. They would have to sell some land, and they would receive a good deal of valuable land from the city, as well as other advantages; and they estimated that the outlay would benefit them by several thousand pounds a year.

Illinois Central.—The earnings for the nine months ending March 31, 1893 and 1892, are reported as follows:

	1893.	1892.	Inc. or dec
Miles operated	2,888	2,884	I. 4
Gross earnings	$14,860,280	$14,817,274	I. $43,006
Oper. expen. and taxes	10,785,122	10,503,543	I. 281.579
Net earnings	$4,075,158	$4,313,731	D. $238,573

The gross earnings from traffic for the month of April, 1893, are estimated at $1,479,539, an estimated increase of $69,231 over the earnings in 1892.

Kansas City, Wyandotte & Northwestern.—The Special Master in Chancery has set July 12 as the day for the sale of this railroad, under the mortgage in favor of the Farmers' Loan & Trust Co. The sale will take place in Kansas City, Kan., and the transfer of the road to the Missouri Pacific is probable, that company having purchased a majority of the bonds.

Pennsylvania.—The Vincetown Branch Railroad, a six-mile branch of the Pennsylvania, extending from a point east of Mount Holly, N. J., to Ewanville, is to be abandoned, as it has never earned operating expenses.

Philadelphia & Reading.—Isaac L. Rice, the accountant who has been examining the books of the company for some weeks past, made public his report last week. Mr. Rice was, until February, foreign representative of the company, with office in London. In March he began an investigation for some of the security holders and the Pennsylvania Company for Insurance on Lives, trustees of the bonds. In Mr. Rice's report he says: On or about Sept. 25, 1892, Mr. McLeod entered into certain individual stock transactions, which resulted in the purchase of 24,036 shares of the stock of the Boston & Maine Railroad, and 32,000 shares of the stock of the New York & New England Railroad Company. On Oct. 15, 1892, he withdrew from the treasury of the company, without having previously obtained the authority of the Board of Managers therefor, and without expressing the purpose for which he intended to use the securities, $30,000 general mortgage bonds of the company, which, as it afterwards appeared, were used at that time as margin in the transaction. He subsequently withdrew from the treasury of the company in the same manner and for the same purpose, between Oct. 28 and Dec. 1, 1892, $713,000 of collateral trust bonds and $99,000 third preference bonds. No reference whatever is made to these stock transactions on the books of the company, excepting the mention of the withdrawal of securities against the personal receipt of the President, nor are they referred to on the minutes of the Board of Managers prior to Dec. 24, 1892. On the latter date the Board of Managers in a resolution approved the transaction calling for the use of $613,000 of the company's collateral, and indemnified Mr. McLeod for advances made for the same purpose to the extent of $400,000. On Jan. 17, 1893, Mr. McLeod deposited $250,000 additional collateral trust bonds as margin, making the total of $963,000 On Feb 16 Mr. McLeod directed that the account be transferred from his individual name to that of the company. On that day he caused the company to deliver to him $250,000 general mortgage bonds and $110,000 first preference income bonds, to reimburse him for security advanced, amounting to $320,000, with the understanding that on the final settlement he would refund the amount received by him in excess of the amount due him. In accordance therewith on April 8 he refunded $8,895. On Feb. 17 he deposited $500,000 third preference bonds, and on Feb. 20, the day on which the receivers were appointed, he deposited $1,000,000 third preference bonds and $250,000 in cash. The total cost of this stock amounts to over $1,500,000. The Boston & Maine stock cost $184.-94 per share, plus a commission of 5 per cent. in addition to the regular ½ commission. The New York & New England cost $42.79. The money obligation involved in the transaction is $3,152.000.

Mr. McLeod has issued a reply to this report, in which he says: "Everything I did, from the beginning to the end, in the purchase of shares of the Boston & Maine and of the New York & New England Railroad Co., was done solely and exclusively for the purpose of insuring to the Philadelphia & Reading Company for its benefit, and not at all for my own, of the control necessary to accomplish this alliance. Had it not been for my desire to benefit the Philadelphia & Reading I would never have purchased a share of the stock of either those companies. My motives and intentions were communicated at the time, not officially, but very fully, to three directors of the Philadelphia & Reading Railroad Company, to one of its prominent officials, and to several other persons. They were fully apprised from the beginning, and throughout, of my intention concerning these shares. It was necessary to purchase about 30,-000 additional shares. I determined to purchase shares to the extent of 15,000, absolutely at my own risk, if I should fail to secure the Presidency of the Boston & Maine Railroad, and the benefit necessarily resulted therefrom to the Philadelphia & Reading Railroad Co. . . . I caused a written contract to be entered into on Aug. 29, 1892, with F. H Prince, of Boston, for the purchase by him of these 15,000 shares at a price not to exceed $185 per share. The Philadelphia & Reading was not mentioned in this contract. It was not bound by its provisions. Mr. Prince agreed to purchase for his own account at a like price a like quantity of shares. The 15,000 shares were purchased. I supplied as collateral $30,000 of general mortgage belonging to myself. The residue was supplied by the Philadelphia & Reading Railroad Company. If it ultimately determined not to assume the purchase, it would have been my duty to make good such contribution by it. Mr. Prince utterly failed to perform his part of the contract. It became necessary to make good his default in the purchase of the remaining 15,000 shares. Of these shares 9,000 were purchased on the same account as that of the 15,000 A personal friend bought the remaining 6,000. . . . If the directors of the Philadelphia & Reading, on Dec. 24, had refused, as was their privilege, to ratify my action, I feel certain that my friends would have assumed the whole purchase. . . . They ratified my action and assumed the purchase. . . . I disclaim all responsibility for the sales since my resignation of the presidency of the Philadelphia & Reading Railroad Co., at very inadequate prices, and in an injudicious way, of the shares of the Boston & Maine Railroad."

Savannah & Western.—Judge Pardee, of the United States Circuit Court of New Orleans, has appointed R.J. Lowrey and H. M. Comer receivers of this railroad. Suit was brought by the Central Trust Co. of New York. Judge Pardee has appointed Comptroller Edward McIntyre, of the Central Railroad of Georgia, a Special Master to take account of all property and assets of the Savannah & Western within 60 days. The Central Railroad of Georgia and the Savannah & Western will be operated together, but accounts will be kept separately.

Toledo & South Haven.—In the United States Court at Grand Rapids, Mich., a decree in foreclosure was handed down this week and judgment entered in favor of the Farmers' Loan & Trust Co. of New York for $306,397 against the railroad company. The road is 37 miles long, from South Haven to Lawton.

Union Pacific.—The earnings for March and the three months to March 31, for the entire system and for various of the subsidiary companies, are shown in the following tables:

UNION PACIFIC SYSTEM.

March:	1893.	1892.	Inc. or dec.
Gross earn	$3,217,417	$3,298,141	D. $80,744
Net earn	918,561	1,035,248	D. 116.687
Three months to March 31:			
Gross earn	$9,239,057	$9,438,704	D. $199,647
Net earn	2,654,999	2,861,460	D. 206,459

OREGON SHORT LINE.

March:			
Gross earn	$510,005	$550,691	D. $40,686
Net earn	189,596	194,936	D. 5,340
Three months to March 31:			
Gross earn	$1,326,038	$1,487,896	D. $161,858
Net earn	405,140	491,589	D. 86,449

OREGON RAILWAY & NAVIGATION.

March:			
Gross earn	$331,022	$326,208	I. $4,814
Net earn	76,483	39,604	I. 36,879
Three months to March 31:			
Gross earn	$869,463	$883,393	D. $13,930
Net earn	133.563	76,407	I. 57,156

UNION PACIFIC, DENVER & GULF.

March:			
Gross earn	$434,559	$435,833	D. $1,274
Net earn	79,157	65,927	I. 13,230
Three months to March 31:			
Gross earn	$1,386,810	$1,270,783	I. $116 027
Net earn	318,323	203,589	I. 114,734

Western Maryland.—The Commission appointed last November by the City Council submitted its report last week. The road is principally owned by the city of Baltimore, and several propositions looking to its purchase had been made by persons believed to represent the Pennsylvania and West Virginia Central Railroad companies. The Commission recommends postponing for two years the consideration of a sale of the road, unless a most advantageous offer for it is received meantime. The commissioners were C. Morton Stewart, Chairman; Mendes Cohen, Mayor Latrobe and the City Comptroller and Registrar of Baltimore. Col. Henry T. Douglas made an examination of the physical condition of the road, and Stephen Little examined the books of the company.

TRAFFIC.

Traffic Notes.

The Interstate Commerce Commission has lately held hearings in Sioux City, Omaha and Cincinnati.

A miniature rate war broke out at Memphis last week, the rate on cotton to Atlantic seaboard points dropping from 50½ cents to 42 cents.

The Cincinnati, Hamilton & Dayton is preparing its docks at Toledo for handling coal, and expects to begin shipping coal to that point within a short time, to be distributed by vessels on the lakes.

The Commercial Club, of Omaha, which appears to be a public Board of Trade, has created the office of Freight Commissioner, and John E. Utt has been elected to the position. Mr. Utt has been Commissioner of the Lincoln Freight Bureau, and was formerly General Freight Agent of the Burlington, Cedar Rapids & Northern.

A St. Paul dispatch states that the law recently passed by the Minnesota Legislature authorizing the construction by the state of a grain elevator at Duluth is so defective that the elevator cannot be built. The object of the law was to provide a public market for wheat so as to protect the farmers from the "elevator ring."

The law recently passed in Montana prohibiting the sale of railroad tickets by unauthorized persons requires all authorized agents to exhibit a certificate and to secure a license from the Secretary of State, but, according to a Helena dispatch, only two roads, the Northern Pacific and the Montana Union, have complied with the law.

The West Shore will discontinue through passenger car arrangements over the Grand Trunk to Chicago when the through trains over the Nickel Plate are put on, and the Grand Trunk has arranged to run cars to and from New York over the Rome, Watertown & Ogdensburg and the New York, Ontario & Western. There will be two trains a day, running through to Chicago in about 36 hours.

The Chicago & Ohio River lines have agreed on round trip party rates from Ohio River points to Chicago as follows:

Over 50 and under 100, limit 8 days, $10.
Under 200, limit 6 days, $9.
Under 300, limit 3 days, $6.
Under 400, limit 4 days, $6.
Under 500, limit 6 days, $6.
Under 600, limit 10 days, $6.

A press dispatch from Sioux Falls says that the South Dakota State Railroad Commissioners, Messrs. F. J. Conklin, O. H. Warner and J. H. Brennan, have decided to take no action under the recent law giving them power to fix passenger rates. After consulting with the Interstate Commerce Commission the commissioners came to the conclusion that the law was unconstitutional. The Interstate Commerce Commissioners took the same view and there will therefore be no attempt to make rates.

Chicago Traffic Matters.

CHICAGO, May 17, 1893.

The parties who recently were so successful in disposing of a large number of forged tickets purporting to have been issued by the Sibley, Lake Bisteneau & Southern, appear to have been encouraged to prepare other fraudulent rickets, ostensibly of the issue of the Portage Creek & Rich Valley—a mythical road. It would seem that the victimized roads ought to make an effort to bring the guilty party to justice, but as yet no arrests have been made.

A conference was held here May 13 between Presidents Jeffery and Reinhart, at which, it is said, the Colorado passenger disagreement was settled. All rates not interstate have been ordered restored to-day and rates to and from Utah points will be restored as soon as the law will allow. The details of the settlement are not given out and it does not appear what is to be done about the reduction in train service which the Denver & Rio Grande desired to make. The reductions originated by this fight have affected the Union Pacific materially, that company having been compelled to reduce the rate from Utah common points to Colorado common points to $13.

A meeting of Western passenger representatives is to be held May 19 to consider the situation eastbound from Colorado. The indications now are that at this meeting the suspended new agreement will be put into operation, and that an agreement will be reached respecting trans-Missouri business. With these two agreements made effective, there will be no trouble in coming to an agreement for the maintenance of World's Fair rates.

It is announced that the Alton and probably some of the other roads will not adopt the rule lately agreed upon by the Western Passenger Association making a charge for the transportation of bicycles and baby carriages in baggage cars. The argument is that by so doing the road would be liable for damages in case of injury to the vehicles and that these damages would be in excess of the additional revenue derived from the charge proposed.

It is probable that the Southwestern Missouri River lines will succeed in reforming the Southwestern Association soon. The retirement of Vice-President Waldo, of the Missouri, Kansas & Texas, will probably facilitate matters. He was opposed to any Association machinery, as being too expensive.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines, for the week ending May 13, amounted to 58,390 tons, against 52,536 tons during the preceding week, an increase of 5,854 tons, and against 50,619 tons during the corresponding week of 1892. The proportions carried by each road were:

Roads.	W'k to May 13.		W'k to May 6.	
	Tons.	P. c	Tons.	P. c.
Michigan Central	7.857	13.5	6,745	12.8
Wabash	3,385	5.7	3 756	7.2
Lake Shore & Michigan South.	11,871	20.3	10,209	19.4
Pitts., Ft. Wayne & Chicago	8,324	14.3	7,427	14.1
Pitts., Cin., Chicago & St. Louis	6 478	11.1	6,265	11.9
Baltimore & Ohio	3,203	5.5	3,283	6.3
Chicago & Grand Trunk	4,656	8.0	3,335	6.4
New York, Chic. & St. Louis	4,499	7.7	4,913	9.4
Chicago & Erie	6,260	10.7	4,635	8.8
C., C., C. & St. Louis	1,857	3.2	1.950	3.7
Totals	58,390	100.0	52,536	100.0

Of the above shipments 3,233 tons were flour, 23,856 tons grain and millstuff, 7,454 tons cured meats, 12,396 tons dressed beef, 1,191 tons hides and 7,004 tons lumber. The three Vanderbilt lines carried 41.5 per cent., the two Pennsylvania lines 25.4 per cent. The Lake lines carried 55,737 tons, against 82.215 tons during the preceding week, a decrease of 26,478 tons.